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HE CHOICE  
OF A

DWELLING



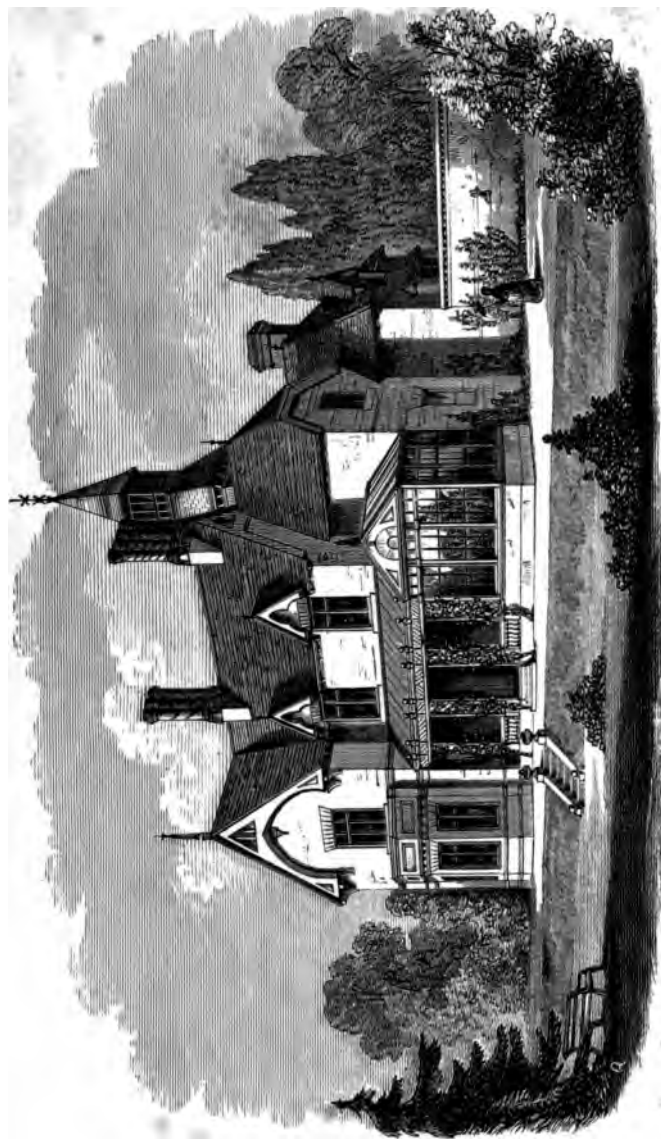


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THE  
CHOICE OF A DWELLING.







SKETCH OF COUNTRY HOUSE,

*Frontispiece.*—No. 22. See Page 180.

*THE CHOICE OF A DWELLING.*

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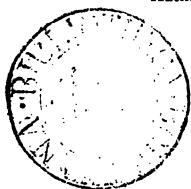
A  
PRACTICAL HANDBOOK  
OF  
USEFUL INFORMATION

ON ALL POINTS CONNECTED WITH  
HIRING, BUYING, OR BUILDING  
A HOUSE,

WITH ITS STABLES AND GARDEN-OUTBUILDINGS.

BY GERVASE WHEELER, ARCHT.

Author of "Rural Homes," "Homes for the People," &c.



WITH PLANS AND VIEWS.

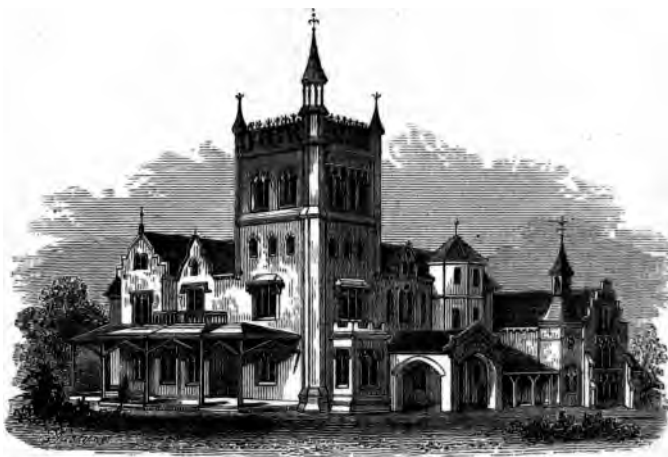
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[See page 190.]

## PREFACE.

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IT has fallen to the lot of most people to be obliged to select a dwelling for lease or purchase ; to many to be obliged to build one. Only when such a necessity arises, is the advantage of special knowledge fully perceived, and those who do not experience this for the most part pay for rashness and want of consideration. The object of the following work is to afford to persons so situated the benefit of the experience of others, as to what they should seek, and what avoid ; to what points their enquiries should be directed, and in what consist the excellences of a well-built house, and the dangers and misery of an ill-constructed one.

To readers thus specially interested, useful information, divested of technicalities, and simple, practical advice, as free as possible from purely architectural details, are here offered. The arrangements of the Dwelling as conducive to health, convenience, and comfort, are mainly kept in view, whilst the few explanatory Illustrations are *Plans*, affording rules for general guidance, rather than *Pictures* of models for imitation.

The scheme of the book was suggested by Mr. Murray, whose notes and practical hints have been of great value. The form and general idea are entirely his, and as these exactly coincided with my own thoughts, writing the following pages has been a pleasant task.

GERVASE WHEELER.

9, CONDUIT STREET, REGENT STREET,  
LONDON, *November, 1871.*

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*Erratum.*—Page 152, l. 9 from bottom, for “value of,” read “value as.”



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# THE CHOICE OF A DWELLING.

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## PART I.

### PRACTICAL MATTERS APPLICABLE TO ALL HOUSES.

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#### CHAPTER I.

##### THE SOIL, DRAINAGE, AND WATER SUPPLY.

IN the following pages an attempt will be made to give useful information on such general points as are interesting to all about to hire, to buy, or to build a house, or to improve one already possessed. Although written by an architect, there will be scarcely a word about architectural styles, and as little as may be of technical details ; in short, the purpose steadily held in view will be the consideration of the subject in a popular light, and the offer of such suggestions as occur from the accumulation of professional experience.

Leading points relating to all houses will first be made clear by a brief description of the materials and mechanical processes employed in the construction of buildings, so that the reader may readily refer to each separate head for information required on any particular.

In considering the question of a house, the point of first

practical importance is the ground it stands on. This should be looked at in two ways—the *soil*, as affecting the healthfulness and the durability of the building, and then the *site*, in respect to its aspect and conveniences.

### § 1. Drainage of the Soil.

When a choice can be made, gravel, sandy loam, rock or chalk are preferable to clay, but, as this selection cannot always be exercised, it will be as well to see what precautions may be used to guard against the objectionable qualities which a particular soil possesses.

The great essential is to secure a perfectly reliable *drainage*; with this, any soil can be made comparatively suitable, and without it the best will be found defective.

*Drainage*, as will presently be seen, means not only the appliances used for carrying away all offensive fluids and solid matters from the inside of a dwelling, but also the removal of all surface water from the ground within and without the area of the building. A light soil under favourable circumstances will do this naturally, but it may be that the flow is interfered with at some point distant from the house, and then the saturation of the soil, which can only spend itself by evaporation, becomes a serious evil. If, therefore, the soil is depended upon to secure the necessary dryness round a building, the soil itself must be under-drained into a satisfactory outfall.

### § 2. When Clay should be avoided.

Clay soils are most to be avoided when under light upper ground they are found in impervious beds that will not permit water to sink through them, or when they lie in irregular layers, rising sometimes to the top and then presenting a barrier to the lateral flow of the surface water.

In such cases the only safeguard will be found in thoroughly efficient drainage consisting of a course of pipes from the house to an absolutely unobstructed outfall, and the main drain must be so built and maintained in repair, as to give security that its proper working will not be impeded ; moreover, it must be ascertained that there is no danger of future legal objections being made to the course the drain may take, to cause it to incur any risk of being cut off ; precautions should also be taken to prevent too many houses being drained into one outfall.

Both the surveyor and the lawyer should be consulted on these important points ; the first to examine whether the drain is properly laid, and the latter to ascertain whether the right of way to the (perhaps distant) outfall can be at any time called in question.

### § 3. When Clay is suitable.

But where the upper layer of clay is sound and tenacious, of sufficient depth to secure stability, and of uniform level, and nothing intervenes to prevent the passage of the water through drain pipes to an ultimate discharge, clay may be made unobjectionable as a building substratum ; which, as it is so abundant in many parts of England, and especially in the suburbs of London, is a matter of considerable interest. The following precautions should be adhered to in building upon a clay soil.

### § 4. How to Build on Clay.

The excavations for the whole space of the building, including an area of not less than three feet beyond all external walls, should be carried down to the required depth for the footings of the foundations so as to reach a solid bed of tenacious character, and if the upper layer seems porous and yielding, as much of it must be removed as suffices to

reach an uniformly solid substratum. On this smooth area the plan of the building should be marked out and trenches dug for footings and drains ; then before any bricks are laid (or stone or any other materials intended for the foundations) a bed of concrete must be spread of not less than six inches, both under all footings and as a layer over the entire surface extending over the area beyond the house, so as, in fact, to place the building in a shell of concrete bedded in the clay. In the clay itself beneath this artificial shell must be drains to carry off all water from springs, or that may ooze out of the clay from pressure, without which the concrete will be insufficient to exclude the damp, and will become honeycombed and porous. All these precautions taken, if the work has been thoroughly done by a conscientious builder, will prevent the danger of damp, even from a clay soil, and the outlay will have been well bestowed.

#### **§ 5. Clay at great Depth below Surface.**

When clay lies at a great depth, and upon it is a hard dry gravel of such firmness as to make a good foundation for the building, then the excavations will only require to be made to suit the walls and general levels, the stratum of gravel forming a natural drain for the flow of permeating water. But in this case the ultimate outfall must be quite a matter of proved certainty or the clay will eventually cause trouble ; when any doubt exists of this the mode of protection just described must be resorted to.

#### **§ 6. How to make the best of Clay.**

One good thing about a clay soil is, as an old digger used to say, "you know your worst," for the bed once reached, there are certain indications to show a builder its character and to let him know how far its stability and

depth may be relied upon, whereas in open soils unexpected conditions frequently occur in the shape of quicksands, holes, water, and other accidents causing troubles and difficulties and frequently entailing heavy expenses. In some neighbourhoods the nature of the subsoil is so provokingly unreliable that it is not unusual for a cautious builder to refuse to enter into a contract for a house until after the excavations have been got out, and he can fairly see what the work in properly carrying up the foundations will amount to. This is a plan that may with advantage be followed in most cases in the country for the mutual interests of owner and builder, for it is quite certain that in all instances of doubt the latter will leave sufficient margin in his own behalf.

#### § 7. Air-drain round external Walls.

An open air-drain around a house is most important ; the most effectual method of obtaining which is afforded by the plan indicated in a previous section (4), which gives an area around the entire building. This may be left open or drained and filled with loose stones or bricks as the treatment of the site requires. In the walls themselves, metal gratings, or air-bricks, should be inserted above the surface of the ground, and immediately under the floor timbers, to produce a current, the only effectual preventive of dry rot.

#### § 8. Brick Drains and Cesspools to be avoided.

In the country general directions only are possible, but the rule is, avoid *brick drains* and *cesspools*. Where no out-fall exists, and consequently the system of drainage must be completed on your own estate, the simplest scheme is afforded by the use of *Earth Closets* for management of solid matter, and a copious supply of water to dilute and

carry off the fluid. The latter should be employed at once to irrigate the land at a point as far distant as convenient from the house, whilst the contents of the earth closets (which if properly managed are entirely inoffensive) should be at once applied to manurial purposes. It should however be noted that if the earth that has been put to its proper use and then has been removed from the receptacles provided by the apparatus, is kept perfectly *dry*, it may be stored for a long time without becoming a nuisance, and this quality renders it extremely serviceable to the gardener. The only precaution recommended is to add fresh earth as dry as possible to it, or to partially bury it in a convenient spot. In either case earth is a natural and always reliable deodorizer.

Where an objection exists to the use of earth closets, and a copious flow of water for household use is available, the contents of the drains should be carried as before to the lands under irrigation; with water in plenty, no unpleasant effects whatever will be found to result.

The key to all innocuous irrigation is thorough drainage, which when duly provided, so perfectly can the system be made to work that liquid sewage admitted into the surface of the ground through channels cut at such depths as the crop to be cultivated requires, will percolate through the soil to the under drains, and thence be carried off to the outfall, and will run out bright and sparkling and entirely free from odour. It must however be borne in mind that though the flow shows as clear as spring water, it frequently holds chemical poisons in solution which render its discharge into rivers or water-courses in some slight degree dangerous; by re-distributing this water, however, over land on a lower level, this objection will be greatly lessened.

#### § 9. Evils of intercepting Tanks.

Under no circumstances can intercepting tanks or reser-

voirs be recommended—they but arrest and localize the evils, and are always most expensive and unsatisfactory. Sanitary engineers fully agree that, let the mode be what it may, the only safe system of land or house drainage is to convey the contents of the drains from the point of collection to that of distribution, in the most direct and rapid manner possible.

**§ 10. Landmarks and Plan to show Direction and Levels of Drains.**

In laying a system of house drains in a country place, some permanent marks should be retained to show their direction and depth below the surface, and a careful plan or map should be prepared and retained exhibiting every drain and connection, and marked intelligibly with corresponding references to the permanent indications inserted as landmarks. However small may be the plot of ground built upon, this should always be done, and when any alteration or addition is made the same should be carefully represented on the drawing.

**§ 11. Access to Drain Pipes.**

All drain pipes should have at frequent intervals a length with a movable cover so that the interior can at all times be reached and cleansed. For cleaning them out, flexible rods with a brush at the end, and another with a scraper, will be found most suitable.

**§ 12. Increase Diameter of Drains as they lengthen.**

If the drains are of great length, it is well to enlarge their diameter and increase their fall as the distance extends. A glazed stone-ware barrel drain six inches in diameter, increased to seven, eight or nine inches as the drain extends in length, will suffice for an ordinary dwelling.



The fall should never be less than one quarter of an inch to each foot in length, and as much more as the declivity of the ground permits.

**§ 13. Start House Drain below every part of Building.**

The whole of the drainage from a house should start from below the lowest level of the lowest part of the building ; unless this is done, incalculable evils will arise if any connection of sink, soil pipe or drain pipe is made therewith.

All drainage should be collected into one point, and thence the main drain should lead to the outfall, if possible without a junction and by the nearest and most expeditious route. The head of the drain which receives the several branches of the various house drains should be made with a movable cover for cleansing.

**§ 14. Soil Pipes should so discharge as to be flushed.**

All soil pipes should be contrived to discharge into the head of the drain at such points as will permit water-pipes and waste and overflow pipes to empty behind them. By this means a flush of water will be at command to carry off the more solid bodies discharged, and will assist their rapid removal down the main sewer.

**§ 15. Junction of House and Main Drains.**

The junction of the house drains with the main drain or sewer is a matter of very great importance. In metropolitan districts, proper officers have this in charge, but in the country (and, indeed, for security in towns also) personal supervision is necessary. In all cases the drains should discharge into the top or upper portion of the sewer, and the mouth should be enlarged so as to freely pour out the

contents ; where a tubular drain is (as it should be) employed, a short elbow, bent with its mouth downwards, is the most useful termination of a drain-pipe.

**§ 16. The Angles must be Acute.**

When one drain connects with another, the angle must be as much prolonged as possible, so that the combined currents may readily unite. Drain-pipes have lengths specially manufactured for such junctions, called from their shape Y pieces, and these should always be used in preference to hand-made connections in brickwork or cement.

**§ 17. Drain Pipes must be Smooth inside.**

In all cases the thorough working of a system of drainage will greatly depend upon the freedom from obstructions in the interior of the pipes, so before finally closing in, each length ought to be left perfectly clean and smooth, and any cement or mortar that may have fallen in should be carefully removed.

**§ 18. For good Drainage, plenty of Water and proper Fall necessary.**

The rule to secure good drainage is, clear pipes, plenty of water, and a gradual fall, whilst to keep the house sweet and dry, and its lower storeys healthful, an equally imperative rule is that before given, namely, to lay the starting-point of the drains in all cases below the very lowest portion of the building, and to insist upon every connection thereto being trapped at the junction.

**§ 19. Ventilation of Drains.**

Much has been written and said about the *Ventilation of drain-pipes*. For the length required by the sewer of an ordinary house, the capacity of a 6-inch pipe (12) is

sufficient to permit the passage of all its contents, and likewise a flow of foul air in a course opposite to that of the current at bottom of the pipe, and as the accumulations of noxious gas reach the head, a simple and natural mode of getting rid of it presents itself in the provision of an upright pipe carried above the levels of the gutter and discharging high enough to prevent the possibility of injurious odours entering through any upper windows. This pipe may be of cast iron, three inches in diameter, and should never be omitted in specifying the appurtenances of a well-contrived house.

In a long length of drain, should its course pass near the wall of an outbuilding, advantage may be taken of the circumstance to run up such a pipe above the roof, connecting the foot with the drain, and so drawing off the foul gases generated within the parts below it. The provision of this second pipe, or indeed of any further series of pipes, does not suffice to make the one at the head of the drain superfluous ; that must be recognised as necessary in all cases and be insisted upon accordingly.

The following very pertinent remarks appeared in the *Building News* of December 3, 1869 :—

“ Stoneware pipes have now [replaced the large square dry built brick drains of former days, and this is no doubt a step in the right direction. The laying of them is, however, generally entrusted by speculating builders to some ignorant navvy or labourer, whose only recommendation is that he is ‘an old *shore* hand.’ This genius takes a row of houses to drain at so much apiece ; he does as he lists, and the only anxiety the builder has in the matter is that the job shall not cost too much money. The district surveyor either has no power to direct how the work shall be done, or, if he has, he does not trouble himself to exercise it. Hence we have pipe drains laid under basement floors without even ordinary precautions being taken to insure that their joints are water-

tight, and as a consequence liquids, and sometimes even solids, find their way out and saturate the subsoil; waste-pipes from sink stones are passed just through the scullery flags and discharge into an open untrapped junction; out of which the gas from the sewers is constantly spreading itself under the floors; the top of the sink waste-pipe is closed by a bell-trap, the grating of which, with the bell, being loose, servants calmly remove when obstructed, and thus open a free communication between the kitchen and the Barking sewage reservoirs. A worse arrangement than these (if such be possible) is, however, that of connecting the overflows from cisterns directly with the sewers. I should like every householder who thinks it worth while to read a letter on an unsavoury subject to examine for himself where these overflows are taken to in the case of his own house. He will probably find a cistern in the scullery with a lead pipe standing up in it to about top-water level. His plumber will tell him this pipe is trapped, and point out triumphantly that greatest effort of his intellect, the orthodox syphon bend. The inspector for the waterworks company will at the same time suggest that if the ball-cock is so 'set' that the water runs down the overflow at the time it is coming in by the service-pipe, the householder will subject himself to a penalty for wasting water.

"Frequently there is not even this pretence of trapping, and if professedly done it is an entire delusion, because no water passes down the overflow wherewith to form the trap. This pipe then becomes a direct flue for ventilating the drains—into the house.

"The same thing is repeated in the cistern placed over the bath-room or upstairs closet—the overflow discharging into the solid pipe, and thus day and night two streams of sewer gas are at liberty to enter, one into the basement, the other into the attic. When windows and doors are open the presence of this gas is not felt, as it is dispersed and

diluted; but during the night it accumulates, and, finding its way into sleeping chambers, becomes, in hundreds of cases, the unsuspected cause of illness and death.

“In the winter months, when every occupied room has its fire, and all means of ingress for external air are closed, a sort of exhausting action takes place in a house, and the foul gas from badly jointed drains under floors, and from ill-constructed connections, is sucked up and passed through the rooms and the lungs of their occupants, to supply the place of the air ascending the chimneys. Truly, an admirable system of ventilation! These are plain facts, the truth of which every occupier of an £80 semi-detached villa can test for himself. Is it not time, then, in these days of sanitary commissions and social science congresses, that some really efficient machinery should be established whereby builders of houses shall be compelled to construct them in accordance with sound sanitary principles, and thus render them fit habitations for human beings?”

#### § 20. Water Supply.

Before building or taking a house, next in importance to the drainage it is essential to ascertain that arrangements can be made for a good water supply.

#### § 21. Rain Water.

When the water that falls upon the roofs after collection by the gutters and rain-water pipes is preserved in a cistern for domestic use, the reservoir should always be either above ground or above the level of the head of the drain. Sometimes the cistern is sunk below the basement floor, but when so its interior will be rarely cleansed, the water must be raised by pumping for use, and lying at a lower level it cannot be emptied into the drain without much manual labour.

### § 22. Slate and Brick Cisterns.

For rain-water tanks of small size slate answers exceedingly well, but for a cistern of sufficient capacity to supply the wants of a large family, brickwork cemented will be found preferable.

The best form for a *brick cistern* is a long parallelogram not too wide nor too deep. Twelve feet in length by four in width, and three feet six inches in depth in the clear, will be found convenient, and will contain a little over one thousand gallons, a sufficient store of water to supply a family, excepting in unusually dry seasons. If more is wanted, smaller tanks within the house can connect with the general reservoir outside. If the walls of the building form one or more of its sides, an extra thickness of half a brick should be given to them at these points, and the wall should be laid in hydraulic cement. The interior should be lined in cement, before doing which the brickwork must be allowed to settle, which should not amount to much, if hard bricks have been used and the joints are small.

### § 23. Filtration.

To free rain water from deposits and impurities, *filtration* is always necessary, and this can best be done in the cistern itself, the pressure of the large quantity of water assisting the operation.

For the filtration of water in moderate quantities for drinking purposes, a very simple and cheap apparatus may be contrived in the following manner. Place two upright sheets of zinc wire netting about three inches apart at a few inches distance from the end of an ordinary cistern from which the water is drawn; in this perforated enclosure put cotton wool and powdered charcoal enclosed for better convenience in a linen case; the water filtering through this

will pass off perfectly bright and clear, however turbid may be its condition at the other end of the cistern.

To construct a self-filtering rain-water cistern a simple plan is to divide the cistern at about four feet from the end from which the water is drawn by two upright frames of perforated zinc placed eight inches apart. Within this partition sharp, clean, well-washed sand, small broken pebbles, and "scraps" of soft iron should be poured in, and, if these are kept clean and renewed about once a year, a perfectly pure and wholesome water will be secured. Charcoal is sometimes directed to be added, but this, unless very frequently renewed, loses its value as a disinfecting agent, although useful for a small and slowly accumulating supply of very highly filtered water.

**§ 24. Waste and Overflow Pipes to be trapped.  
Access to Ventilation.**

Care should be taken that the waste pipe for emptying the cistern, and also the overflow, are efficiently trapped where they enter the drain.

The top of the cistern should be so made as to allow of the interior being freely inspected and cleaned. If of York stone, the slabs should be divided into two or three pieces, one being over the filtering compartment and capable of separate removal. If of brick arches, a hinged cover should be left at the same point, and the same remark applies to slate or a wooden roof. No openings should be left in the top, ends, or sides above the water level; they only afford admission to snails and vermin, whilst, for purposes of ventilation, the rain-water pipes that run up to the roof will be found most effectual. To keep the water cool in the summer an occasional coat of lime-white will be found efficacious.

**§ 25. General Water Supply.**

Besides the water collected from the roofs, the house

requires a constant supply of pure, clean, and wholesome water for domestic use. In the country this must generally be obtained from private sources; in other places public companies bring it within reach. For the former, wells with manual labour, or machinery to raise it to the necessary levels to supply the service of the house, are the means most usually found.

#### § 26. Wells.

In constructing a well the first point is its situation; it must be at such a depth and in such a stratum of soil as to be absolutely free from contamination by drains or cesspools (if the latter are permitted to exist), whilst for convenience it should not be removed too far from the domestic portions of the house. As a general rule, water may be obtained in any spot where a house would be likely to be built, by going to a sufficient depth; the quality and permanence of the supply will depend generally upon the depth of the excavation. Wells as usually made by country diggers rarely go deep enough, but since the introduction of cheaper apparatus for boring, with the practical knowledge that workmen who undertake this special work now possess, there should be no difficulty in obtaining pure water, fit for drinking and for washing, in almost any part of England. As to depth, the general rule is to go sufficiently deep to pierce the lower bed that forms the upper shell to the pure water mains, although springs sufficiently pure may often be found nearer the surface. In the London basin these springs are found in the lower cretaceous formation underlying the clay.

It must not be assumed, however, that the levels of all water in wells would be the same in a given neighbourhood, for the springs that feed them may be intercepted by varying strata, more or less porous, so that the pressure on each well would vary.

The soils in which water may be expected to be found



near the surface are, first, the upper vegetable soil *if it rest on clay*, but if otherwise, as upon sand or gravel, no reliable supply will be reached until this has been penetrated and a retentive substance of impervious clay has been found.

The London clay\* as a rule affords no water, but immediately below it, if beds of sand or plastic clay exist, springs may be relied upon.

The great source of water supply in the London basin is the chalk formation, of which the fissures and porous strata form immense lakes and rivers that geology shows to be inexhaustible.

In older rock formations, water is found below porous beds with tenacious sublayers, or in fissures, as under the Portland beds, or in the Fuller's earth below Oolites. Limestone being porous yields water to its wells, as does the New Red Sandstone.

Wells are of two kinds, the ordinary well of nearly uniform diameter throughout, and the Artesian, which will presently be described.

### § 27. The Ordinary Well.

In forming an ordinary well, four feet in diameter, it should be protected from falling in at the sides by what is technically called "steining." This consists of brick or stone work of thicknesses proportioned to the nature of the soil through which the well has to pass. Ordinarily, the first four or five feet from the surface is laid in 9-inch brickwork, the bricks being new, sound, well-burnt, grey stocks, set in Roman cement and sharp clean sand. Below this, the brickwork would be  $4\frac{1}{2}$  inches in thickness laid dry, and with rings of brickwork three courses deep laid in

\* N.B. In places within the London basin the clay has been pierced to a depth of 500 feet without reaching water.

cement, about every four feet apart. This would suffice, excepting if land springs were encountered, in which case the steining should not only be laid entirely in cement, but behind this should be a foot in thickness of "puddling" of sound well-beaten clay.

A well so made might be sunk to any required depth, and below that, if boring were necessary, the process could be safely carried to any extent.

In digging a deep well, danger often arises from the presence of carbonic acid gas in large quantities. As a means of relieving the atmosphere and making it safe for workmen, lime-water plentifully dashed in is generally resorted to; but a better plan is to have ready a large wind-chest or bellows worked by hand (and which any carpenter might make of boards and canvas), which could be used to force pure air down a 2-inch zinc pipe to the required level.

### § 28. The Artesian Well.

The Artesian well derives its name from Artois, in France, as in that district it has been in early and general use. Formerly the term was confined to such wells only in which the water flowed to the surface by hydrostatic pressure; but now it is applied also to all wells fed by a deeply sunk metal pipe, in which the water is raised by pumping or other machinery.

The expense of boring is now so greatly reduced, and the science of construction of these wells is so well understood by those who undertake them, that they are coming into almost general use in localities which favour their introduction. Where the dip of the strata is such that a pressure can be relied upon to bring the water to or near to the surface, they do not entail much expense; but, to prevent disappointment, before thinking of an Artesian well, the opinion of an engineer acquainted with the geology of the

locality should be obtained, or else the expense of boring may be incurred, and then, after tapping a source of permanent supply, the rise may prove insufficient to bring the water within reach, without an engine-house and all the other costly appendages of a pumping-station.

As no one would be likely to undertake the boring of a deep well without competent advice, it is not necessary to enter into any details of the process; suffice it to say, that special experience is necessary to successfully encounter the many adverse circumstances that frequently arise, and that the best professional advice procurable, and the best workmen, will always prove the cheapest. In the matter of porous sands alone (for instance), which constantly are to be met with, and impede the work by filling the borings with sand or water, only the large plant of an experienced contractor is of any utility, whilst the makeshifts of country workmen will be sure ultimately to entail heavier expense than the charges of those who made such work their speciality.

A cheap and expeditious method of obtaining water where the source is known to be within thirty-two feet from the surface is now successfully practised. This is the plan found so valuable in the Abyssinian expedition, and consists of a tube driven by machinery into the soil until water is reached. The best appliance of the kind is known as *Norton's Patent Tube Well*, and in ordinary cases the expense, including a hand pump at the surface, is from £6 for a depth not exceeding fifteen feet, up to £10 for a well thirty feet deep. Where the depth is greater than thirty-two feet, a valve in the tube becomes necessary, and a pump of a different construction must be used. For light porous soils, the sides of which are liable to fall in, these tubular wells are well suited.

#### § 29. Hydraulic Rams.

Where the estate affords a run of water constantly flowing,

and having a fall of five or six feet, a *Hydraulic Ram* is frequently convenient. In placing this machine the first material point is to ascertain for a certainty that the supply from the fountain head will not fail in a dry season; the next, to see that precautions have been taken to guard against any obstruction entering with the water, for the introduction of even a small particle of gravel or grit into the ram will impede its action and put it out of repair. If the water is from an open stream, a small cistern-head should be made a few feet above the ram into which the flow may run, and any foreign matters settle to the bottom or be caught by a grating at the mouth of the conduit leading to the drive-pipe, whilst in the drive-pipe itself an inverted syphon should be formed (simply by bending), at the bottom of which a tap occasionally opened would suffice to drive out any minute particles that might have passed the grating and had been caught therein. Again, before entering the ram, another fine grating should be placed, removable by an union screw joint, and these precautions taken the ram will be free from danger of injury from any foreign body getting into the valve. The inside of the drive-pipe should be made perfectly smooth, and as direct in its course as possible, as upon the unimpeded motion of the water therein will greatly depend the force of the ram.

### § 30. Various modes of Water Supply.

Other modes of water supply may be resorted to, as local circumstances suggest; various pumps and wheels are offered by machinists, driven by hand or horse power, by wind, and sometimes by the water itself. On a rapid stream a floating platform on which is fastened a pump worked by an undershot wheel and crank, the feed-pipe from which has at its connection with the pump a few feet of flexible hose to allow of the rise and fall of the water level, has been recommended, but it must be considered as only a fair-weather

arrangement suited to the wants of a family spending the summer season only at the house, as of course the winter ice and frost stop its working.

**§ 31. All Water should be Filtered.**

With a head of water, however, within reach, there should never be any difficulty in conveying it where required; the only suggestion offered is that in all cases the water should be filtered before entering the pipes and again before being led into the house. Too much stress can hardly be laid upon this, both as a sanitary precaution and as a means of preserving the pipes and other appliances for water service in repair.

**§ 32. The Qualities of Water.**

To obtain water absolutely pure, distillation must be resorted to, and so obtained it would be insipid and deficient in many healthful ingredients. The purity of water drawn from the main bed below the clay in the lower chalk formation is sufficiently satisfactory. Its qualities of hardness or softness depend upon the nature of the overlying strata through which it has subsided, and may be modified by filtration or changed by chemical admixtures.

Its *softness* is due to certain soluble earthy particles which, having the property of decomposing soap, make it valuable for domestic use: what is called *hard* water is deficient in those ingredients, and contains mineral salts more or less perceptible to taste.

The most pernicious natural element in water is carbonic acid gas, which, when in excess, gives the soluble bicarbonate so often met with, and which is the cause of the fur on the inside of boilers and teakettles; water containing this gas also has a pernicious effect upon lead pipes and cisterns, causing a continuous decomposition, the result of which is salt of lead—a dangerous and most penetrating poison.

All waters containing acid do not have this injurious effect upon lead; for instance, those which hold in solution sulphuric or phosphoric acid, act upon the lead so as to throw a hard crust upon the surface, through which its poisonous properties cannot penetrate.

**§ 33. Susceptibility of Water to imbibe Atmospheric Impurities.**

As fresh water is peculiarly susceptible to atmospheric influence, being capable of saturation by gases to an extent so great as at times to amount to an equal bulk, it is very desirable that the purest ventilation should be provided for all reservoirs in which it has to be stored. Hence, for domestic supply, when water has to be raised to a cistern, the material of which the cistern is made, its position, temperature of surrounding atmosphere, and exposure to bad odours from drains, closets, or sinks, are matters of moment. All such reservoirs moreover should be filled from the top, as is usually the case, and the *overflow should be drawn from the bottom*, and this seeming paradox may be accomplished by simply bending up the waste-pipe to a perpendicular height level with the inside top-water mark, and then turning it down again. By this means the water will be drawn up from the bottom and the fresh running in at the top keeps the contents freshly mixed; as an additional advantage with an overflow of large size (say two inches), most of the impurities that fall to the bottom would be carried off by hydrostatic pressure.

From these remarks it will be seen that water should not be left exposed to the bad atmosphere of stables or bed-rooms when it is intended to be drunk, and it is doubtful whether the practice of furnishing conservatories and green-houses with water-tanks within the building is a good one, for although the water acquires the desired temperature it has absorbed a large quantity of injurious gas.

## CHAPTER II.

### MATERIALS USED IN CONSTRUCTION.

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CEMENT, MORTAR, BRICK, STONE, ARTIFICIAL FABRICS,  
SLATE, LEAD, ZINC, IRON, TIMBER.

#### § 40. Knowledge of Building Materials.

THE next point of interest to secure the stability and salubrity of a dwelling is the use of proper materials of construction, and these are of such varying quality, and are so susceptible of fraudulent treatment, that a little practical insight into the nature of those generally employed will be valuable.

#### § 41. Cements—Lime—Blue Lias.

The most commonly faulty portions of cheaply built or insufficiently cared for buildings are the *cement* and *mortar*.

The basis of all cements and mortar is *lime*, and upon the quality of the article, and the care in working it, the goodness of the compound depends.

*Lime* itself is never found in a natural state, but is the result of partial burning of chalk or limestone, by which process the acids in combination escape, leaving lime in a state of purity, and in the form known as "quicklime." This is afterwards saturated with water, and after proper admixture with sand and other materials, forms the mortar and cements of the building trade.

The presence of a small quantity of clay in calcareous or

lime-producing stones is valuable, especially for cements that are to be used for water-works or foundations in a damp soil.

The strongest limes are those called *grey*; the stones which produce them are found in the neighbourhoods of Guildford, Merstham, and Dorking.

*Blue Lias* is a material now in common use, and is especially valuable for its quality of setting under water. It may be known by its blue colour before burning, and by its change into a rich brown after it has been subjected to the proper degree of heat. The best comes from South Wales, and scarcely second is that which is brought from Watchet in Somersetshire, and Barrow in Leicestershire. In addition to these well-known localities, Whitby in Yorkshire, and Lyme Regis in Dorsetshire, produce a blue lias nearly equal to them, the cost varying according to convenience of transport.

#### § 42. Sand—Sea Sand.

In making mortar or cements, the next most important ingredient is *sand*. The best of all is obtained from the bed or banks of a clear running stream; nothing also can at times be better than the sand of the upper Thames, or of the beds between the bridges, but as these contain a very large amount of extraneous matters, the sand so obtained requires to be well washed and screened (*i.e.*, sifted) before using.

*Pit-sand* is in greatest supply in the country, and when used it should be so frequently washed and stirred about, as to leave nothing adhering to the fingers feeling sharp and gritty. In all sands a mixture of clay is pernicious, as although valuable as an ingredient in limestones in which the burning converts it into a useful agent, in sand it causes the destruction of the mortar in a very few years. All soluble



or partially soluble ingredients in sand are detrimental in however small a quantity, and should thoroughly be removed by repeated washings, or the mortar will never set, and will soon perish.

*Sea-sand* for the above reasons, and on account of certain chemical constituents of its own, will never thoroughly dry until the salt has been perfectly washed out of it. Unless this has been done in the most thorough manner by repeated washings with pure fresh water, there will be a danger, amounting almost to a certainty, of efflorescence on the walls both within and without a building in which it has been used. The result of this is spots and discoloured patches externally, showing even through the cement, and within the building the peeling off of the papers, and the spongy softness of the plastering. When nothing else however is to be had, it must be washed again and again until not a vestige of saline taste remains, and if this has been thoroughly and honestly done, and the sand has been well dried in the sun by frequent turning, and has been screened, sea-sand thus clarified is often better than such pit-sand as is generally used. Indeed, Professor Wilson records his testimony that certain experiments made in Edinburgh resulted in showing that sea-sand well washed was superior to that brought from pits, but it seems doubtful if the sand subjected to the trial (which was brought from the shores of a tidal river) was as fully charged with salt as that which is found on the southern sea-coasts of England.

London builders require constant watching in respect to their sparing use of water and time in washing the sand they employ for making mortar or mixing with cement, and this although water is always so easily obtainable, and a flexible hose so handy. Pit-sand is almost always used by them, and to this any rubbish in the shape of garden-mould, mud, road-scrappings, and the like is added, the result, as

naturally might be expected, is bad mortar and dry-rot. Such stuff is often palmed off upon the unwary by an unscrupulous contractor as Ballast, but does not deserve the name.

#### § 43. **Ballast.**

*Ballast* consists of burnt clay, which when well burnt, finely ground, and mixed with sharp, clean, well-washed sand, and strong lime, makes a mortar that will set like cement; but stuff often so called is little better than mud.

#### § 44. **Filtered Rain-water best for Mortar.**

The quality of the *Water* used in mixing mortar has occasioned some controversy. It may briefly be said that, where convenient to use it, filtered rain-water is the best, next to this soft water free from mineral ingredients; hot water has been recommended, and is referred to in writings of great antiquity. It is also well known that an admixture of skimmed milk was used by many mediæval masons who derived the idea from ages still more remote. In combination with some cements, even sea-water has been found to serve the purpose, but although when used carefully, and under special direction, it may be well adapted for construction of works under salt water, it would be a dangerous substitute for pure fresh water in the hands of an ordinary builder engaged in carrying up the mason work of a marine residence.

#### § 45. **Mixing Mortar.**

In making mortar no part of the process requires such entire thoroughness as mixing the lime and sand after the water has been added. Once upon a time wooden beaters were used by men for this purpose, but now a machine called a "pugging-mill" effectually and quickly accomplishes the process. The usual proportion is one part of

lime to three parts of sand, the water being poured in gradually and in such quantities as the tenacity of the mortar requires, which will generally be obtained when about one-third of the bulk of the material has been added. In laying hard bricks in mortar, care should be taken that the brick-work is kept wet, particularly in hot dry weather.

#### § 46. Ingredients for certain Qualities.

Other ingredients are sometimes added to mortar to increase its tenacity and hardness. In London a blue mortar is made by the admixture of the ashes and iron dust of a smith's forge; this is used for covering such parts of a building as are much exposed to weather. Ground bricks, brick-bats, and broken tiles, burnt clay ballast, and the slag from glass or iron furnaces reduced to a fine powder by machinery, are likewise used, especially in localities producing the material; but since the freer introduction of artificial cements already prepared for mixing, they are more generally employed even when the separate ingredients abound, if mortar of superior quality and strength is required. The best cements are *Roman* and *Portland* for general purposes; *Mastic*, *Keene's*, *Parian*, and some others for special use.

#### § 47. Roman Cement.

*Roman Cement* is also known as *Parker's*, and when dry is of a heavy dark brown, too positive in tint to be used without colouring. It is made from a clay iron-stone found at Harwich and in the island of Sheppey, and when of proper quality will bear two parts of sand to one of cement. When laid, this cement dries so rapidly, that only a small portion should be mixed at a time. It is mostly used for cisterns, and for carrying up the basement walls or other works subjected to

wet ; if of proper quality, it is when dry completely waterproof.

It is, however, liable to be attacked by frost, and in damp places may often be seen covered with an unsightly vegetable growth, which is absent when sun and a free current of air can play upon its surface. It is, moreover, not adapted to work exposed to great heat, and should therefore not be used alone for setting grates, ranges, ovens, boilers, and the like. Its grand qualities are great strength, and a capacity for resisting water.

#### § 48. Portland Cement.

*Portland Cement* is the best general cement that is known. It must however be of proper quality, and must be used intelligently.

When applied as an external covering of large surfaces, its efficacy is often endangered by carelessness in mixing and working, but for a concrete or mortar it has scarcely ever been known to fail.

In France it is the custom to grind it to a very much finer state than that in which our manufacturers usually supply it, and to require that the ingredients mixed with it should pass through closer meshes in screening. These precautions, together with the thoroughness of the mixing and beating insisted upon, cause cement works as seen abroad to be more reliable and durable than is generally the case at home.

#### § 49. Mastic and other Cements.

*Mastic Cement* differs from others by oil being employed in mixing its constituents. It is composed of ground brick-dust, lime, stone, and sand, with oil, and requires great care in using. As a thin coat on an under coating of Roman cement, it becomes very hard and smooth, presenting a beautiful surface for painting. It is, however, costly not

only in its first application, but from its requiring frequent re-painting on account of the absorption or evaporation of the oil. *Keene's Cement* is in reality only a plaster, susceptible of a very hard and beautiful finish. A similar compound is largely used in America, and the walls prepared with it are said to be "hard finished," presenting a smooth, hard surface, superior to what we are usually accustomed to find with us. *Martin's Cement* is prepared chiefly at Derby, and is a favourite with those workmen who are accustomed to it, as it has the advantage of setting more rapidly than Keene's.

#### § 50. Parian Cement.

Parian Cement is composed of gypsum (plaster of Paris) mixed with borax, calcined and ground. Of this the scagliola, or imitation of variegated marbles, is made. All these cements require time to be given before using on a new work, as, unless the under surface be entirely dry, efflorescence will result. They are used for internal purposes, and are often blended one with another, as their various qualities of hardness, sharpness, or toughness are required. The mouldings around the bases of rooms, and architraves of door and window openings, are now frequently run in cement, instead of being constructed of wood; and, when properly treated, have some advantages thus employed.

#### § 55. Brickwork, and Bricks employed.

Bricks are of two general kinds, stocks and place. The latter are only fit for some portions of the interior, and should never be used in external walls; but being of little cost, cheap builders will lay them even in outside walls, wherever they can do so without detection. The difference between them is that the stocks are those bricks which are in the interior of the kiln, and therefore receive

the full action of the fire, whilst place bricks are such as are used to build the exteriors of the kiln, and are therefore but partially and imperfectly submitted to its heat.

#### § 56. **How to choose a good Brick.**

A hard, well-burnt stock should not easily break, should, when struck against another, give out a clear, ringing sound, and should be well shaped, free from warp or twist, and of uniform texture throughout. This is of more importance than the colour, as often a thoroughly sound, well-burnt brick is of a dull, bluish grey and mottled colour, but very durable and valuable for building purposes (such as foundations) requiring strength rather than external finish. The varieties of bricks used in building are very great, but the differences are more local than general; for practical purposes they may be classified as hand and machine made.

#### § 57. **Hand-made Bricks.**

Hand-made bricks are the common, cheap brick of everyday use. Of these the stocks only are fit for external walls; place bricks being too soft either to stand exposure or to resist heavy pressure. They may be known by their irregular, bulgy shape, by their uneven size, and by the bluntness of their edges. Their hardness and strength depend upon the nature of the clay of which they have been made; but the best qualities of this material are now rarely worked up into hand-made bricks, those produced by machinery commanding a higher price at the market.

#### § 58. **Machine-made Bricks.**

Machine-made bricks are more uniform in size, sharper.

at the edges, more truly rectangular, and generally more regular in colour. The colour of a brick greatly affects its cost and its constructive value.

### § 59. Colours of Bricks.

The blue bricks often seen are made from a clay found in greatest abundance in Staffordshire, and are very hard and non-absorbent, hence their value for paving and for draining purposes. The best should have a silky texture and a vitreous gleam in the sun, and for flooring should be chosen with a corrugated or otherwise roughened surface, or they will be slippery. When the blue brick is a natural product, and its tint has not been obtained by artificial means, it owes its hue to the presence of iron in the clay, but it is difficult to be sure that "art" has not "assisted nature" in effecting the desired colouring. A reliable blue, or indeed any deeply coloured brick, should be of a deep dull red at the core, perfectly free from stones or lumps of any kind.

A "black brick" is sold in London which is of great value in introducing coloured designs in brickwork. This is in reality a deep chocolate of great richness, and is artificially stained. It is more effective for decorative purposes than the blue brick, and is to be obtained moulded as well as plain.

Red are comparatively more common than any other uniformly tinted bricks. They should always be chosen of decided hardness, for a soft cheaply made article is often in the market which will not stand exposure and is so brittle in handling as to spoil a good wall. The rules for guidance in testing the quality of all good bricks (73) should be especially applied to these.

White or Suffolk bricks as they are most commonly called derive their name from the fact that the clay of which

this species of brick was first manufactured abounds in that county. They vary greatly in quality and durability, and are especially liable to discolour on exposure to the atmosphere. The best are those which are hardest in texture and with a slight lemon tint in their colour. An excellent white brick is made in the neighbourhood of Sittingbourne, Kent, which is of great hardness, and yet in the wall has the same softness of tone and absence of glare which characterize the best Suffolk.

#### § 60. Rules to Test Bricks.

The rules to select a good brick are first its uniform size, which should be 9 inches in length, 4 inches and  $\frac{3}{8}$  in width, and 2 inches and not quite  $\frac{3}{4}$  (accurately  $1\frac{3}{8}$ ) in depth. Its weight should be 7 pounds. Its shape should be a true rectangle, and its edges sharp and well defined, with its outer sides and ends perfectly smooth. When two are struck together a clear ringing clang should be heard, and broken should be tough and dough-like in texture and require repeated blows to cause a fracture. A good test of their quality in this respect is the manner in which they bear carting and handling, and whether they come out whole and with the edges unbroken. On dipping them into water a good hard brick will absorb unwillingly and dry rapidly, and when completely immersed should not imbibe more than one-fifth of its bulk.

#### § 61. Hand and Machine made Bricks compared.

Hand-made bricks will be found to stand the above tests unfavourably. The only objection that can be made in regard to machine-made bricks is their weight, some of them being so heavy as to seriously increase expenses of carriage, as also the outlay of building when iron beams or arches are required to carry a mass of brickwork.



### § 65. Stones used by Builders.

The building stones generally employed in private dwelling are Granites, York stone for steps and paving, and Bath and Portland for other portions. There are many intermediate varieties, and the market abounds with the names of quarries more or less in favour, but scarcely a stone but practically may be referred to one of these classifications.

### § 66. Masonry should be adapted to Local Quarries.

In country places where building stones are conveniently at hand they can often be employed with advantage; in such a case their qualities should be ascertained, and the style of the building and class of work should be adapted to their capabilities. If, however, a certain character of architectural finish is insisted upon, that stone only which will permit it should be used. Many an otherwise good stone may be spoiled by being injudiciously used, whilst often a cheap local stone is capable of satisfactory employment when skilfully and artistically treated.

### § 67. Kentish Rag: qualities and use.

For rough walling and foundations the Kentish Rag-stone is very suitable and durable, and is from the nearest quarry to the metropolis, being found in the neighbourhood of Maidstone. It requires watching in use, for often a very large quantity of Hassock, as it is called, is shipped with it, which being very cheap is apt to be used in situations that are not suitable. For lining and backing walls Hassock answers very well, but it will not stand a crushing weight, and is readily acted on by damp. Rag-stone was once very largely used in old buildings in London, as recent excavations in the city prove, and it may be seen in the

underground portions of Westminster Abbey and other coeval ecclesiastical buildings.

#### § 68. Portland Stone.

*Portland stone*, so called from its being found in the island of Portland, Dorsetshire, is a limestone, and has been in use now for about three centuries. The quarries of this celebrated and useful stone vary greatly, and it is not easy to detect how to select reliable specimens. The kind known in the trade as the "best bed" or base bed is not really the best, and on account of the ease with which it is worked is more used in London for external work than it ought to be. This particular bed is a favourite with workmen, as it costs less to work and makes a better appearance when finished than some others; but experience shows that its durability is uncertain, and its use should be restricted to internal work. The brown Portland, or Whit-bed, as it is called in London, is preferable. It is harder and more costly to work; but it stands weather very much better than the last described. Amongst many other large structures the mansions on the estate of the Marquis of Westminster and the new Foreign Office are made of Whit-bed stone. The only objection that there seems to be to this variety is the frequent presence of unsightly cavities and fissures, which have to be filled up when the work is rubbed down.

#### § 69. Result of Commission on Portland Stone.

In a report upon the various quarries that supply Portland stone to the London market, the Commissioners sum up an elaborate description with the following practical remarks:—"The stone in most of the quarries, and sometimes in the same quarry, varies considerably in value. Such stone as contains flints, or is met with below layers of flints, is inferior,

and will not stand the weather. The bottom bed on the west cliff is not a durable stone, but has been worked to a considerable extent, and sold as a 'best' stone in the London market. In every freestone bed the upper part is the hardest and most durable stone. The really 'best' stone is in the north-eastern part of the island, the worst in the south-western. The most durable stone has its cementing matter in a solid and half-crystalline state; in the least durable stone it is earthy and powdery."

#### § 70. Bath Stone.

*Bath stone* is obtained from quarries at Corsham Down, Box Hill, and Farleigh Down, in the county of Wilts, and at Combe Down, in the county of Somerset. These stones are all limestones, of what is termed the oölite formation, and vary very much in hardness and texture. Few of them will stand the destructive effects of exposure to London smoke. Bath stone is said to have been first used in London for houses in Portland Place, and some of it has been employed as the material for restoring Henry VII.'s Chapel at Westminster in the early part of the present century. *Corsham Down* is the Bath stone most used in London, being finer and more even in texture than the other varieties, but it does not stand well for heavy work; another variety, called Corn Grit, which is formed in a lower bed should be employed for plinths and the like. *Box Hill* is harder, coarser-grained, and not susceptible of so fine a face as the Corsham Down; but it is more durable, and bears exposure to the atmosphere better. It is near the Box Hill station, and is obtainable in very large blocks. Its colour is not so bright and lively as the finer varieties, but it seems to fade less in the course of time. *Farleigh Down* resembles closely the Corsham Down stone, and is used for the same purposes. It is, however, only found in small

blocks, and consequently has not such general use. *Combe Down* is quarried on a down of that name, a short distance from the city of Bath. Its selection requires great care, as the blocks are subject to veins, and it often fails on exposure. This is the variety that has been employed in the Westminster restorations of Henry VII.'s Chapel.

*Caen stone*, which belongs to the oölite formation, and before the Bath quarries were fully worked was once very largely used. The finest qualities are still chosen for internal and statuary work. *Aubigny* is a stone brought from the same neighbourhood, and is of similar oölitic formation. It is closer in texture and consequently harder than Caen.

#### § 71. Mansfield, Ancaster, and other Stones.

*Mansfield stone* comes from Nottinghamshire, and is of three distinct colours, white, red, and yellow. The red is the best known, and, like the white, is a sandstone; the yellow being a dolomite or limestone. These stones are usually only employed for small portions of a building, as (especially the yellow variety) they are expensive; but where they have been used they appear to be exceedingly durable, and unaffected by the weather. *Ancaster stone* is also an oölite, and has only as yet been partially used in London. It comes from Ancaster, near Lincoln, where it has been used for centuries in important buildings in the neighbourhood, amongst them Belvoir Castle. The St. Pancras Railway Station and Hotel are recent examples of its use. *Ham Hill* and *Douling stone* are of similar class, and come from Ilminster, in the county of Somerset. They are a shelly limestone of the oölitic formation, and may be seen in Wells Cathedral, Glastonbury and Sherborne Abbeys, St. Mary's Taunton, and other well-preserved edifices of corresponding dates.

### § 72. Wiltshire Freestone.

The *Wiltshire Freestones*, better known to London workmen as *Tisbury stone*, are of two kinds, one a flint-bearing limestone called *Chelmark*, and the other Tisbury a sandstone. Tisbury has only been used in London during the last ten years, although it has been used in the districts for centuries. Salisbury Cathedral and Wardour Castle are examples, and exhibit the stone in excellent preservation.

### § 73. Need of Government Report on Stone.

The above list comprises the usual stones required in construction, but beyond the brief enumeration of their qualities it is hardly possible to go. There is no subject upon which so little is known by professional men and building mechanics as that of stone, especially as to its durability and the principles of selection. The causes of failure, especially in towns, are really almost impenetrable; and although disgust and recrimination speedily set in when the crumbling of the stonework of a costly building shows that "some one" is to blame, it seems scarcely possible, with the scant means of information which we possess, for an engineer or architect to guard against such unfortunate results. All he can do is to trust to the experience of others, and to select such particular stones as appear before to have given satisfaction. Our geological museum gives really the most meagre amount of practical information, and has scarcely any commercial value as a means of reference. What is wanted is the appointment of a special commission of competent men, consisting of an engineer, an architect, geologist, chemist, sculptor, builder, and stonemason, with special powers to examine thoroughly all the sources of supply, and then draw up a careful comprehensive report, such as the French government recently made

by their chief engineer. As it is, all an architect can do is to name the particular quarry to be used ; but though this may be done in the specification, how can he be sure he obtains it in the work ? It is not easy to tell, and his idea of "best" and the contractor's refer to very different qualities, the latter considering that the "best" which is cheapest and easiest to work. For a large and important building in which stone is to be extensively used, the best advice as to selection should be obtained ; the architect should be allowed liberal means of examining and testing ; and then reliable supervision should be employed to see that not only the quality chosen is used, but that it is worked in a proper manner ; for it is well known stones seem to have whims of their own, and require to be handled and humoured in a variety of ways that an old quarryman or stone-mason soon obtains the knack of doing, but which are most puzzling to an interested looker-on. In a large work, an experienced man from the neighbourhood should attend the working of the stone in the mason's yard.

#### § 74. Dressing Stone—Surfaces and Finish.

It may not be out of place here, before closing these few remarks upon stone, to offer some suggestions upon the dressing and finishing of surfaces and joints.

In Gothic work there has been a pernicious custom of fining everything down to a smoothness and prettiness of finish that cannot be too greatly condemned. In Italian architecture, where what is called breadth of effect is a primary element of beauty, anything which detracts from the unity of the surface is to be avoided, and hence the excuse for finish and fineness and regularity of joint ; but in Gothic work such treatment is destructive of all true spirit and feeling.

The late Mr. Pugin contended in his "Contrasts" for the employment of small stones, and in irregular joints in preference to larger blocks and a perfectly even masonry; but, thanks to the true principles of which he was the pioneer, it is safe now to say that the stone should be left untouched after it has been built into the wall; such is the honest, purely legitimate treatment, and should be insisted on. After a stone has been shaped and fitted into its place in a wall, all after-scraping and "dragging" (as it is technically called) should be forbidden. Not only does the durability of a stone wall suffer by a removal of its air-hardened natural skin (which is not supplied again if once scraped off), but the chance inequalities of surface, when allowed to remain, produce a refraction of light and a play of tone and liveliness of tint which no artifice can restore.

Even moulded work should follow the same rule; every individual stone should be just sufficiently finished as not to appear unnaturally rough, but when once in place no after fining-down should be attempted. Every close observer of old work will have noticed that, where the surface has been sufficiently protected to permit the marks of the tool to be seen, the course of the scrapings over the whole surface is never seen, but each stone stands as it were distinct. So with us, when the stone requires after-touching to bring the surface to about an uniform plane, and to take irregularities off that may appear too prominent, the tool should not be scraped evenly over the whole, each touch in the same direction, but irregularly, sometimes obliquely, sometimes up and down; but, after-finish as you may, the advice that should be given to all who think stonework improvable by smoothness, and would go over it again, is "don't!"

**§ 75. Exaggerations of Roughness reprehensible.**

But, on the other hand, that unnatural exaggeration of roughness which some architects affect is equally reprehensible.

sible. To *make* a stone purposely rough is in as bad taste as to make it unnaturally smooth; often more time is seen spent upon working it into undue irregularity than should suffice to dress it, and then, by way of contrast, the corner stones or quoins are finished as smoothly as possible. Workmen are exceedingly obstinate in this respect, and have a superstition of their own, which it is almost impossible to eradicate, as to the necessity for extra fine surfaces to all corner stones. Reflection should show that as these are the most exposed to the weather, if anything, the surface should be less disturbed by a fine tool after the necessary shape has been given to it, and it has been brought to a proper surface by the axe. There is reason to believe that a powerful aid is often lent to the various destructive agencies at work which eat into the surfaces of building stone, by the parallel lines of after-finish, running over all joints alike, and forming channels often in direct opposition to the natural direction of the bed, which stone-masons are so fond of, and clerks of the works permit. As to what is technically called the "corduroy" finish to cut stone, it ought to be prohibited by the Building Act.

#### § 80. Manufactured Fabrics—Terra-cotta.

In addition to these natural materials used in construction, many manufactured fabrics are employed. Of these, *Terra cotta*, *Encaustic tiles*, and *Tessera*, and some patent compositions may be enumerated. *Terra-cotta* is a valuable aid to the architect, not only for purposes of decoration, but in certain special cases for construction. As a means of providing cheap ornament, it is far preferable to cements, and when well made is durable beyond any artificial material known. The Royal Albert Hall, South Kensington, is a notable example of its use, and presents a perfect epitome of all that may be learnt as to how Terra-cotta should be em-



ployed. For covering broad, unbroken surfaces, it is not well adapted, because in drying, under the intense heat to which in manufacture it is subjected, it is apt to bend and warp, a defect not of much consequence when the piece is of a curved or irregular shape. Hence, for continuous unbroken lines, as in cornices or string-courses and the like, there is often a waviness at the joints, which can skilfully be concealed by special design, such as the employment of bosses, medallions, trusses, or other dividing ornaments introduced to break the continuity of the lines.

"The red bricks used in the Royal Albert Hall were made by Mr. William Cawte, of Fareham, and the terra-cotta, more than 80,000 blocks of which have been supplied, is from the manufactory of Messrs. Gibbs and Canning, of Tamworth.

"Terra-cotta, or burnt clay, was used by the ancient Egyptians, Greeks, and Romans for structural and ornamental purposes, and was largely employed in Italy at the period of Renaissance as a building material. Indeed, much of the architecture of Northern Italy and Lombardy is characterised by its red terra-cotta work. In England bricks of a superior kind, assimilating terra-cotta, were sometimes used in the sixteenth and seventeenth centuries, as, for instance, at Sutton Court, near Guildford, at Hampton Court, and at Oxhead Hall. After falling into disuse for nearly 150 years, the manufacture of this material was revived at the commencement of the present century as a substitute for stone: from the works of Messrs. Coade, in Lambeth, came the terra-cotta which is mainly used in the decoration of St. Pancras Church, Buckingham Palace, and the Regent's Park Terraces. After a long interval of inactivity the demand for terra-cotta appears to be again on the increase, and the new buildings at the South Kensington Museum, the Arcades of the Horticultural Society, the Alleen's College at Dulwich, and the Sun Fire Office at Charing

Cross, may be named as successful illustrations of its employment.

"Terra-cotta is, as we have already pointed out, a well-made and carefully prepared brick, and, used as a decoration for a brick structure, its employment appears to us perfectly legitimate. We regret to see that some architects in dealing with terra-cotta forget its brick origin, and treat it as if it were stone, aiming at great truth in the lines and edges, and adopting a flat, thin relief of the enrichments suitable only for carved work in hard stone. The terra-cotta work for the Albert Hall has been made in moulds, and left, as far as possible, untouched by the workman; no effort has been made after excessive regularity, and the blocks are all of a small size. By this means a picturesqueness is imparted to the façade, which, taken in conjunction with the play of colours in the different blocks, gives a richness of effect wholly unattainable in stonework." ("Report by G. W. Redgrave.")

### § 81. Encaustic Tiles.

*Encaustic Tiles* as materials for floors and for wall-decoration are now so well known, and, thanks to Mr. Minton and others, are so cheap, as to need little remark. They require skilled workmen to lay them, and the best of cement, both as bed and for the joints. For walls of larders, bath-rooms, housemaids' sinks (most urgently should it be insisted on for these latter), this clean non-absorbent material is most valuable.

### § 82. Rigid Bed for Laying indispensable.

The only practical remark offered is that care must be taken that the bed on which tiles are to be laid, whether for floor or wall, is perfectly prepared, so that the surface

and even surface, and *Pan or Flemish*, the surfaces of which are curved. Varieties of each of these are seen under the names of Italian, Taylor's roofing tiles, and Terro-metallic tiles, and a tile with a double curve, called Bridgewater double roll. Tiles are generally used for covering the roofs of cottages, outbuildings, and structures of a picturesque character, and are occasionally seen on churches. As a rule they require to be laid on a roof of sharper pitch than would serve for slates.

Ridge tiles and crestings are procurable in great varieties of patterns, and in red, blue, green, and black tints; the ridge tiles are made in cylindrical rolls, with a saddle-piece coming down upon each side of the roof, and a flange and groove at top to receive the ornamental cresting. Those made for the crest tiles to be inserted when laid are more durable and easily repaired than such patterns as have the ridge and cresting cast in one, the latter being easily broken, and when thus attached can only be repaired by removal of the whole tile.

#### § 88. White Glazed Tiles.

A white glazed tile is manufactured in Holland, and also at home, suitable for lining the walls of bath-rooms, dairies, larders, and the like; this differs only in colour and fineness of surface from the encaustic flooring tile previously described.

#### § 89. Slates—Qualities of a good Slate.

The best slates that are supplied to the building trade are brought from Wales and from Cornwall; next in quality are the Irish; whilst, on the authority of Mr. Gwilt, the "slates of Scotland are not in much repute." Of all these the Bangor slate is the most esteemed.

A good slate may be known by the ringing sound it gives

out on being struck, and by its feel to the touch. A hard durable slate should have a rough harsh feeling, which is indicative of its small power of absorption of water, whilst the contrary properties will be found with such as have a smooth greasy feeling.

The quantity of water absorbed by a slate in a given time is a certain test of quality. The best slate is one which will retain the smallest possible amount ; in selecting a roofing slate, therefore, out of certain samples submitted for approval, a safe plan will be to carefully weigh and mark each before placing in a tub of water, then after several hours' immersion let each slate be taken out, carefully wiped dry, and the correct weight ascertained ; that which has gained the least will be the most durable slate. Professor Ansted (quoted by Mr. Gwilt) states, " that the best slates are those which are most crystalline, and which when breathed upon give out but a faint argillaceous odour ; when this was given out strongly, then the slates would readily decompose."

#### **§ 90. When Slates preferable to Tiles.**

Slates are superior to tiles for roofing purposes, principally on account of their reluctance to receive water, which in the tiles, even when they are glazed, is an inevitable cause of fracture in the winter, besides greatly adding to the weight that the roof timbers have to support. Their expansion is also far less ; hence, for hot climates or under sunny exposure, they are less liable to crack.

#### **§ 91. Slate Slabs.**

The large slate slabs that are now sent to market for cisterns, shelves, and other fittings of a house, have greatly increased the advantageous purposes to which that material can be applied ; there yet remains, however, an important use which could be made of the thin veneers (so to speak)

which some of the Welsh slates permit the huge blocks to be split into, which has not been fully taken advantage of for many useful domestic matters.

**§ 92. Use of Thin Slate in Sheets.**

For lining cisterns (instead of lead), winter wardrobes, or closets (to exclude moths and all vermin), and many other instances that will readily occur to an intelligent house-keeper, this material, attached to an ordinary backing by a thin coat of cement, would be very suitable and valuable. It is stated that slates can be procured not more than one-sixteenth of an inch in thickness, and in sheets of very large size; and are so flexible as to bend like ordinary veneer—a quality adapting them to curved surfaces or any “odd corner.”

**§ 95. Timber—Difficulty of procuring Seasoned.**

The timber of a house is an important element in its sound construction.

The great difficulty in all timbers is to secure such as are seasoned. The only safeguard is to employ as contractor a man of such standing and capital as can afford to retain his stock on hand, and to let it get seasoned before use. If this cannot conveniently be done, it will be well to assist the builder, by enabling him to buy such timber as may be required from such a source; for if purchased in the market, nothing but new stuff can generally be found. For the joinery and inside finish, and especially for the floors, a few pounds spent in obtaining seasoned wood will, even with the smallest building, be a wise economy.

**§ 96. Timbers usually employed.**

The timbers usually employed in dwellings are Dantzic,

Riga, and Memel firs, and for sleepers seasoned oak. They should be free from large loose knots and from shakes and splits. Elm is valuable, especially in damp situations, and will bear the insertion of spikes, nails, rods, bolts, or other metal work without splitting. The strength of all timbers that are intended to carry a great weight increases in proportion to their depth: thus a beam one foot broad and one foot deep, which will support a given weight, will sustain but twice that weight if it be two feet broad and one foot deep; but reverse the position, and make it one foot broad and two feet deep, and it will carry four times the weight.

**§ 97. Floor Timbers should be Deeper.**

Hence floor-timbers should be deeper than they usually are, to secure strength and stiffness, the want of the latter quality being sought to be supplied by all sorts of after-contrivances in the way of cross-bridging, which a greater depth would have rendered unnecessary. In an otherwise well-finished house, the shallowness of the floor-joints and consequent unsteadiness of the floors is a defect only too frequent.

The use of outside slabs and battens by cheap builders cannot be too much condemned; as a rule, flooring-joists should not be less than eleven inches deep by two and a half thick and twelve inches apart, for a length under sixteen feet; beyond that length their depth and thickness should increase in proportion.

## CHAPTER III.

### CHOICE OF SITUATION FOR A HOUSE.

#### § 100. Features to be secured.

IN looking for a house, or for the land upon which to place one, the leading features to be secured may be stated as follows:—a healthy site with good water, convenient nearness to a railway-station; in the suburbs, one which affords a speedy and brief journey to town; a dry sub-soil, or, if clay, one that can be brought within the requirements of treatment that have been already detailed; an elevated position, so as to secure a good natural current for the house and surface drainage, and a reasonably productive soil for the garden. Secondary only to the above, the domestic convenience of the house requires that the church, the doctor, and the market should be within easy reach; but as these may come nearer as a neighbourhood increases in population, the natural features of the site are what should guide in a selection in the first instance.

Soils, and how to treat them, have been discussed; and although no rules can be laid down for selecting a site, because every place differs, there are some general principles that apply to all cases.

#### § 101. Selection of a Site.

The choice of the site of a house requires the greatest care, and should never hastily be decided on: other features

of an estate may be changed, levels may be altered, lakes filled in or developed, trees planted or removed, roads and approaches shifted or abandoned, as often as experience may suggest ; but the house once placed, there it must be, and remain the enjoyment of a lifetime or a never-ceasing cause of regret.

The house should stand upon high ground ; not necessarily upon the summit of a hill, but having a sufficient fall from it on all sides to secure thorough drainage. The summit of a hill is difficult of access, requires special arrangements to supply the house with water, and is generally bleak and exposed.

The slope of a hill avoids these objections, and permits planting a background of sheltering trees while leaving an open expanse in front.

In placing a house upon a slope, especial care should be taken that the most prominent feature of the design should rise from its lowest side. For instance, a house, possessing a tower at one end of a flank, would look dwarfed and strangely out of place if rising from the highest level of the ground ; in such a case the eye, taking in the lines of the building from the surface level upwards, would balance the greater depth of wall required upon the lower side against the superior elevation above the roof, and the latter would suffer. Reverse its position to the lowest end, and the feature becomes marked and important ; and besides which it seems to be a support to the whole building, and planned to counteract the slope of the hill.

#### § 102. **Table Land with Background.**

In some situations the best site for a dwelling is a higher level of comparatively flat table land, which, without being exactly the summit of a hill, is yet elevated above the surrounding surfaces. In such a case, should no trees or woods



form a background, all that can be done must be to surround the dwelling as much as may be with architectural shade, in the shape of verandahs, porches, and the like, trusting to the future growth of young trees and shrubberies to relieve the bareness of the building, and gives its outlines connection with the landscape. The usual presence of water in a hill must be considered. Deep and thorough drainage is the only safeguard. Also that the supply may be cut off by the sinking of neighbouring wells at such a lower level as to tap one parent spring. In such a difficulty a well of great depth must be resorted to, or, until that became necessary, a cheap and simple substitute would be the tubular boring process known as *Norton's patent tube wells*, based upon the American system, that proved so serviceable to our troops in Abyssinia.

#### § 103. Trees.

Trees too near a house are not desirable; they cause damp, and interfere with ventilation. Some varieties are less objectionable than others, and any naturally of small size, such as yews, cypress, thorns, or any others that do not screen the sun too much, may be suffered as near as it is wished. The cedar is a harmless tree near to a dwelling, being cool, dry, and no retainer of damp; on the contrary, the elm or beech must be kept at a considerable distance. The sycamore is especially a mischievous tree too near a building.

#### § 104. Shelter from prevailing Winds.

In all situations a sufficient shelter from prevailing winds should be sought for; and if not to be found, preparation must at once be made to secure it. Prudent home-founders prepare for themselves future shelter by planting trees all around as soon as they gain possession of the

ground, and will set a belt of thickly set trees or evergreens across the hostile current long before the house has been commenced, so that the desired shelter shall be secured. It is well to put the shoulder of a hill between you and the north or east wind, but, on the other hand, in hilly districts the storm currents sweep up the valleys, and are twisted and driven in unexpected angles over the openings. In order to shield the house, therefore, a belt of trees across the opening of the valley is desirable.

#### § 105. When to cut down Trees.

Particular localities require such diversified treatment that the only safe rule to be insisted on with regard to trees is:—plant freely,—cut down, not at all,—until residence in the house shall afford experience as to where to make gaps and openings in the newly planted groups, and what older specimens may advantageously be removed. When, however, the nearness of a particular tree to the house interferes with convenient approach or with ventilation, then its fate should be decided at once; but if no such considerations are in force, and questions seem to turn upon matters of taste, or obstruction of a distant view, it is well to abide by the former rule and let the decision rest for a year; by that time circumstances alter, and often good reasons come to light why the offending tree should be allowed to remain.

#### § 106. Aspect to be considered.

A house ought not to be set down at haphazard, but so far as possible with special regard to the cardinal points of the compass. Where the plan is compact, and its leading lines approach to a parallelogram in shape, it is safe to set it diagonally to the four points, securing by that means the glint of the sun upon all four sides and its direct beams upon none to the exclusion of the others. Then,

if the principal rooms can have a S.E. or S.W. aspect, and good prospects also can be enjoyed from its windows, there will be nothing to complain of, so far as aspect is concerned. Of course the rule must sometimes be broken in order to take advantage of a good point of view, but, as far as practicable, avoid placing the habitable rooms to face the east in districts near to the German Ocean.

#### § 107. Bay Windows only for Views.

The enjoyment of special views, and the command of desirable features of the situation, can best be obtained by skilful placing and shaping of the windows; in each important room these points should be studied upon the spot, and after the general distribution of the apartments has been made satisfactory, the openings for windows, whether plain or projecting, should be adjusted with reference to locality as well as to architectural effect. In regard to effect it is an axiom that common sense in architectural design is the reliable source of beauty, so that any feature made necessary for the enjoyment of the particular site cannot fail, in an architectural composition, to become precious if honestly treated. Mr. Ruskin confirms this when he says, "until common sense finds its way into architecture, there can be but little hope for it."

#### § 108. Sunlight and Air.

Sunlight and air are the chief essentials for health in a dwelling. We have sometimes too much glass in our rooms, and the result is glare, not light. The position of the window has more to do with the cheerful and even diffusion of light than its size.

#### § 109. To obtain free Light without Glare.

In a well-contrived room of liberal dimensions, the aper-

tures should be so placed as to permit at all times of the day one of the windows to be unshaded, because unvisited by the direct rays of the sun, whilst those upon the sunny side are screened by shutters or blinds. Hence a bay window with straight sides, in which are narrow strips of glass, is often a great comfort to a room. The broad central sashes in front can be entirely covered, and one or both of the side lights left open as the position of the sun requires. The bay with angular sides does not so well provide this means of tempering the light and excluding glare.

#### § 110. How to light Halls and Stairways.

In halls and staircases lighted by glass at the top, a common fault may be noticed of making the glass surface too large. Much loss of internal heat results from this arrangement during the winter, whilst in summer, when the rays of the sun are poured upon the glass, the interior is often almost unbearable. For light, a really small aperture is all that is often necessary; and could it be shown how minute an opening properly placed (for instance, at the apex of a dome) will suffice to light the space below, the conclusion would at once be reached that our skylights are wrongly constructed in this respect. The small prism-shaped deck lights of ships prove how large an area can be illuminated by direct rays through comparatively small openings. Therefore, for the lighting of inner halls, &c., a skylight need have but a very small surface of glass on the top, provided it has no obstruction whatever above or around it. For admission of air, apertures should be left in the perpendicular sides, which can be closed or opened at will, and these should not be glazed. The glass inserted in the top aperture should not be flat, but, whether in one piece or in a congeries of smaller pieces, should be externally so shaped as to present angles for refraction of the

rays of light. These remarks do not so much apply to picture or sculpture galleries lighted from above; these require special treatment, and a good example of the proper mode of so doing will be found in a subsequent section.

**§ 111. Circulation of Air round a House.**

To secure proper circulation of air in and around a house, stipulate that there is an open space on all sides free from obstruction, and that the grade of the ground in all instances slopes from the building; even on the side of a hill this can be done, and unless successfully accomplished the evil of stagnation of air and consequent bad ventilation will be felt. About a house so placed the mists from the lower levels will stubbornly hang, and resist dispersion; the frosts too will remain after the higher and more open lands have become free from them, and will still settle upon such a spot, and a chilly heavy atmosphere pervade the house and the ground around it. Many country houses there are which seem to have been built in a basin.

**§ 112. Trees in small Forecourts bad.**

In the immediate neighbourhood of London and other large towns, where land is so valuable that but little space can be devoted to the average villa residence, a bad custom prevails of filling the small enclosure in front with large shrubs and trees. Damp is certain; and as to the dust, which at times will rise, however well watered the roads may usually be, the trees only ward off the nuisance in summer-time, and are useless against the blustering winds of winter. The proper way is to erect a close wall against the outer pavement, of such a height as to screen the interior from passing observation, and at the same time not to obstruct the view from the windows. Within this wall may be a screen of dwarf shrubs, which can be kept

frequently washed and watered by a flexible hose, and between this and the house the surface should be such as can most easily be kept dry and clean. Small flower-beds are not recommended in such confined enclosures; better place boxes and pots with such flowers and shrubs in bloom as the greenhouse or nursery gardener can supply. Then let the forecourt be of asphalte, close well-laid gravel or tiles, or, if of sufficient extent, of good turf; but not the latter, unless the surface drainage is good, and there is space for at least twelve inches of good soil upon a lower bed.

**§ 113. Glazed Arcade convenient.**

When—as in such situations is usually the case—there is insufficient space for a carriage drive to the entrance door, an enclosed glass approach will be found a great convenience; and if this is put at the extreme side of the front court, there will be no interference with light and air. Examples of this may be seen in Chapter 9, Illustration, No. 14. In arranging this useful adjunct to a suburban house it is better to have but one external entrance, serving alike for the family, for visitors, and for servants; at the steps to the front door, a gate will indicate the passage to the domestic offices. By having but the one approach, the space in front is less cut up, and a great evil in all domestic experience, the back gate, is avoided.

**§ 114. Sunlight and free Air prevent Damp.**

In choosing a situation for a suburban residence, or for a house in a street, select a frontage that has the sun upon it, that is, one not with a northerly aspect. When this cannot be done, and the width of the plot will not permit side windows to the principal rooms of a detached or semi-de-

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tached building, it will be absolutely necessary to follow the directions before given as to the avoidance of trees or any large shrubs in the small forecourt. Without sun, trees harbour wet, and give it out so steadily that it is impossible to prevent damp. Next to sunlight, a free circulation of air is the best preventive of damp, and this cannot be obtained if the space be blocked up with trees. Small plants in boxes or pots, as before suggested, are all that should be permitted, and perhaps a border of dwarf shrubs against the boundary wall, or a screen of dwarf ivy trained thereon.

## PART II.

### RENTING OR BUYING A HOUSE.

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#### CHAPTER IV.

##### RENTING A HOUSE YEARLY, BY AGREEMENT, OR ON LEASE.

###### **§ 120. Inquiries to be made respecting House.**

HAVING selected a neighbourhood that seems to combine the advantages of soil, suitable climate, and convenience of situation in regard to church, shops, and railway or other means of locomotion, the house itself remains to be chosen. Probably the choice will be limited to a very few ; for even in a new neighbourhood, buildings that are well contrived, judiciously situated, and in desirable localities, rarely remain long on hand ; whilst in long-settled places the existence of a large number of unoccupied houses is suspicious, and before taking one the most careful inquiry as to the cause of so many empty dwellings should be perseveringly made. Under any circumstances it is well to be wary of a house that has been long unlet ; but, where many such are seen in a neighbourhood, extreme caution is essential.

###### **§ 121. If under Supervision of Official Surveyor.**

In suburban districts, the fact should be ascertained whether houses recently erected have been built under the



supervision of any local authority, such for instance as Surveyor to the Local Board, or if they are within the radius of metropolitan jurisdiction. Many outlying districts around London are under no building control whatever, so that builders can erect houses exactly as they will ; and although it is true that, even within the limits of the Building Act, houses shamefully scamped are only too common, yet the smallest amount of compulsory observance of certain rules intended to secure stability and safety is better than no rules at all, so there is wisdom in ascertaining what, if any, have been the building restrictions prevailing in the locality selected.

**§ 122. District Surveyor's Opinion desirable.**

Following this idea, in the absence of any means of obtaining from a friend or from a competent professional adviser (an architect or large contractor) the character of the special house in the locality selected, it would be found a safe and satisfactory rule to call upon the legally appointed surveyor of the district and obtain his opinion. Generally, such an officer will be able to give much special and useful information, and his fee for an interview and such time as the business transacted might consume would be money well bestowed. Further than this, possibly a survey of the building and some professional services in shape of a report in case of a lease would ensue ; so that the surveyor could well afford to give proper attention to such matters, and so treat a client as to secure similar applications from others.

**§ 123. Houses erected on Speculation require Caution.**

In the absence of local advice (and even with it), the house-renter must take care of himself, and avoid a house that is a mere builder's house—one of a lot run up as a

speculation for sale. These so often change hands at first that their real character is not always at once apparent. Frequently respectable private gentleman have been seduced into purchasing them as an investment, or have through their lawyers advanced money, and the interest remaining unpaid, because the houses have not met with purchasers, have been compelled to foreclose and take them into their own hands, and so they pass into respectable ownership. Inquiry in the neighbourhood will generally elicit their history; and if the house under consideration is found to be of the kind above described, be very wary indeed of tying yourself by any agreement or lease. Should the house suit your family, take it for a year only, and even then sign no paper whatever that has not been submitted to your lawyer.

**§ 124. Character of Builder important.**

But there are builders and builders, and it by no means follows that, because a neighbourhood has been improved and built upon by a contractor as a speculation, the houses are all of the suspicious class. Without the enterprise of builders, the house-seeker in the vicinity of large towns would be poorly off. If the residence in question has been built by a respectable, responsible man, you will have a security which would not be the case had the construction been undertaken by a small needy speculative builder. The latter could by no possibility afford to keep a stock of timber on hand sufficiently long to season, and would probably have interchanged portions of the work with other craftsmen as needy as himself, and so have managed to run up a lot of poorly built tenements without responsibility or general supervision.

**§ 125. How such Houses come to be built.**

A custom prevails amongst men of such a class to take a

number of building lots together: one will do the brickwork, another the timbering, another the plastering, another the joinery, another painting, and so on, each trade working out the value of the other in turn, and it may fairly be presumed each one trying, as the slang of the trade is, to "best" the other on every possible chance. Thousands of houses so built stand (for a while) round London, and are specious traps for the unwary: these builders generally get rid of them at any price as quickly as finished, and start again a row of similar dwellings elsewhere. Avoid such houses by all means, and indeed, in all doubtful cases, the one year's occupancy is the rule; twelve months will suffice to bring to light advantages or defects, and is what every prudent man will insist upon.

**§ 126. Dryness and good Construction essential.**

The points that an intending tenant should look to, are dryness and fairly good construction. First of all dryness; the certain indications of this carry most important correlatives, and are tests of important qualities.

**§ 127. Dryness proof that Drainage is well devised.**

A dry house can only have been originally built upon good, well-prepared building soil; its drainage must be sufficient, and the plumbing and water supply in good order and judiciously applied. Ventilation also must be good; for even a house well and substantially built, and in itself free from damp, will not remain dry unless free currents of air within and without are unobstructed in their flow.

**§ 128. Indications of Dryness.**

The indications of dryness must be looked for literally from the foundation. On entering the lower story of a

dwelling—particularly if it has been for some little time unoccupied—the sense of smell will generally indicate the state of the atmosphere; but, to be fair, it should not be taken as conclusive, if unpleasant. Accidental circumstances may have been in fault, as for instance the omission to replace a trap in the sink; so, leaving doors and windows open below, whilst the upper floors are explored, a final visit again to the lower regions or domestic offices will confirm or modify the first unfavourable impressions.

#### § 129. **Absence of Dryness.**

If any of the lower rooms are papered, and the building has been for some little time unoccupied, or is quite a new building, the touch will unmistakeably disclose the dampness or dryness of the walls. If these appear soft and wet, particularly near the floor, examine outside as to the levels of the ground around the building to see whether the damp strikes through; if so, and no other cause should be found, that is an evil that can be remedied, and should not be sufficient to condemn the house. A plank in the lower floor should be taken up, if possible, when if dry rot has commenced it will show itself; even for this though there is a remedy, so do not give up the house thus far; but these two suspicious appearances, wet paper and fungus under the lower floor, should make a rigid examination insisted upon.

#### § 130. **Examine Depth and Nature of Drains.**

To this end inquire about the drains, what and where they are, how deep, and made in what manner, and do not be satisfied until all that can be ascertained is laid before you. Every effort will be made to blind, assurances that all has been done in the most thorough manner will be volubly poured forth; but get a surveyor, or if the landlord will allow,

let the stones or earth or floor be taken up, and a very slight acquaintance with work will show an amateur the quality of the whole by the appearance of the bit laid bare.

**§ 131. Indications of badly constructed Drains.**

If the ground around the drain-pipe (supposing the most favourable possibility) or the brick drain (unfortunately more likely) is black and wet, giving out offensive odours, appearing slimy and showing saturation, you may be sure the drains are defective; they either leak at the joints, or there is a stoppage, and the contents ooze through. Whilst the ground is open, let a labourer pour down some water from a sink or through a closet (preferably the latter) at a point above the part inspected; the fluid will run through, and on passing will show itself if there be a leak, or presently will come back again and force itself out through whatever opening exists, if there be a stoppage below. Should these evidences appear, the landlord will for his own sake have the drain laid open to see where the trouble lies, and then (the house in other respects pleasing) the intending occupant can satisfy himself that in this respect all is as it should be.

**§ 132. Workmen's Neglect in making Drains.**

So far for the outside house drain; this made all right, the dryness of the house will be affected by the manner in which communication has been made with it. A leak in plumbing soon shows its whereabouts, and can be repaired; but faulty connection with the drain is shown only by manifesting its evils, so that a house may be occupied many months before this most disastrous source of mischief can be suspected as existing. As an example,—an expensively finished, high-rented, semi-detached villa, in a fashionable suburb, was taken by a family on a long lease, and not until

after nearly a year's occupancy did the bad air of the basement attract attention to the fact of there being something wrong. Sinks were examined, and a closet for the servants was looked to ; but the water passed off freely, and no outer evidence at first showed itself. Presently, however, a small patch of damp began to increase in the wall of a larder, one end of which came against the closet in question. On calling in advice, the closet floor was taken up, and a state of things was made evident that scarcely seems credible. *No connection whatever existed between the closet and the drain!* For the sake of saving less than five feet of drain-pipe, the syphon at the bottom of the pan had been left to discharge its contents into the space below the floor ! Fortunately, the walls were carried down a considerable depth, the soil was dry and porous, and there were foundations around each side of the closet ; for everything had been allowed to settle there as in a cesspool, and, until the contents rose to the floor level, there was nothing to indicate the deadly mischief going on. This arose undoubtedly from the reprehensible carelessness of some one particular workman : possibly, he was short of the few lengths of drain-pipe necessary to finish the job, and, rather than wait for them, he closed all in, and left it apparently as it should be ; of course water, &c., would pass down, so there would be nothing to lead any one to suspect such a deceptive state of things till the nuisance became only too palpable.

**§ 133. Dryness depends on proper Gutters and Leaders.**

Another security towards dryness is the proper construction and fitting of the rain-water leaders, conveying the contents of the roof gutters to the drain or cistern. If the joints of these are not tight, the water will be sure in time to penetrate a brick wall, and to find its way even behind cement.

**§ 134. Rain Pipes led into Soil Pipes dangerous.**

Again, often these pipes are led into a soil-pipe of a water-closet, with the ostensible view of helping to flush the same and assist to carry off its contents, but more truly to save a few feet of pipe. There is very great danger in this arrangement, and on two accounts; first, in frost, should the soil-pipe be closed by freezing (often the case), the roof water will pour itself through the pan and pipes of the closet into the house in such quantities as to cause great damage and destruction,—this is inevitable; a second danger is from an obstruction arising from anything finding its way down the pipe from the roof (dead leaves, birds'-nests, rags blown thereon, and the like), or any bulky deposit from within choking the soil-pipe, then, when rain comes, the water must flow back, and the evil is the same as from frost. These sources of mischief are enlarged upon, because it is not unusual to see such a disposition of the rain-water leaders and soil-pipes. The plan has been occasionally recommended by professional men as tending to ventilate the soil-pipes and drains by the up-draught of bad air through the leaders and its discharge above the roof, but the mischief arising from stoppage is quite enough to counterbalance this advantage. A better mode of effecting this result can be obtained by providing an independent pipe, as previously described in section 19.

**§ 135. Dryness affected by Materials used.**

Thus far the dryness of the house has been considered as dependent upon drains and other appliances. An even more important side of the question remains, and one, unfortunately, neither so easy to investigate, nor, when found, so readily to be cured; and that is the nature of the materials employed in construction, and how they have been used.

**§ 136. Troubles from poor Bricks, &c.**

Soft bricks, unwashed sand, poor lime, in other words, "scamped" walls, cause trouble that no after-doctoring can remedy. A newly built house of course requires a sufficient time to dry; but, if properly built, it *does* dry, and, although discomfort arises from being forced to occupy such too soon, it is scarcely possible for a well-built house to bear the requisite processes of finishing and yet be seriously damp. The danger is in the quality, more than in the newness, of the walls. Good fires, plenty of lights (especially from gas), will soon dry an interior; whilst the sun, light, and free sweep of the winds will do the same good office for the exterior, if the walls have been properly laid on foundations resting upon dry footings, with damp courses carried above them, and other honest precautions taken.

**§ 137. The Occupation of a New House.**

Beyond the staining of delicate wall-papers and the impossibility of properly painting on green walls, there are no real dangers in occupying a new house built as it should be: the danger too often is that the house is both new and bad, and this especially is the case when the outside is cemented.

In all poorly built houses, the newly run-up stucco-covered wall is the most prolific source of damp. On old walls, perhaps constructed of bricks that will not stand the weather, and so have become unsightly, cement is often the only sure way of obtaining a dry and a warm external shell for a dwelling; but when the temptation of using *place bricks*, any rubbish that will do as mortar, and the other incentives to work up cheap and worthless material which the use of external cement will permit to a speculating builder are considered, it is not to be wondered at that a prudent man



would look very doubtfully at a smart, new, showy Roman cement villa before entrusting his family within it.

**§ 138. How bad Work shows itself.**

One redeeming feature is that the stuff is too positive in its nature to lend itself long to deception. It must have been honestly used, or *it will perish*; so a very little examination will show, in the black stains, scaling of the last coating, falling to pieces of the showy cornices or balustrades, what are the quality and character of the brickwork that lies behind it, and what its own value is. Let no sophistry explain away the facts that *failure in cements* exposed to the weather indicates *bad workmanship* and *bad materials*; probably, also, incurable dampness.

**§ 139. Damp in Detached Houses.**

In the suburbs of towns, houses are often seen with cement on the front only, the sides and back being of bricks uncovered, or sometimes rough-cast or lime-washed. On the score of dryness (only) such houses, *when new*, are preferable to those entirely coated with cement, because brick walls rapidly give out to the sun and wind the large amount of water they contain, and thus the inner surfaces become more quickly dry.

**§ 140. Quality of Material for Dryness.**

From these remarks it will be seen that quality of material is meant, rather than material itself. A well-built, substantial house may have its external walls coated with cement, and, if so, the choice of such a finish is only a matter of taste; but, inasmuch as the material affords so good a cloak for hiding defective work, extreme caution is required in cases where houses are enclosed in it.

**§ 145. Chimneys and Flues.**

On passing into the interior, attention is called first of all to the *flues*, because imperfect construction of fireplaces and smoke-passages is one of the most common and injurious defects in houses.

If the building has had previous tenants, a poor draught will generally leave its mark in scorched and stained mantels, and in other indications of smoke that a careful eye can detect. A glance up to the roof-top will disclose, too, whether unsightly wind-guards, or other chimney terminals have been applied by the "smoke doctor" to mitigate the nuisance.

**§ 146. Smoky Chimneys.**

The evil of smoky chimneys is often curable, sometimes not. If found to arise from too small a flue, roughly finished and affording obstruction to the free passage of smoke or of the machine that should clean the chimney, there is but little encouragement to try a cure; but, if the flue is of proper size, it is worth while to examine what opposing circumstances exist to impede its proper working.

In country places, oftentimes a tree too near to a chimney-top will stop the current of air, and cause a downward draught. The remedy is not necessarily the removal of the tree, which may be valuable, but such a change in the form of the terminal as will take advantage of all winds that blow excepting from the quarter cut off by the tree; and as the down-draught is nearly always caused by an eddy thrown back from the resisting bulk of the tree, by closing the top of the chimney at the side nearest the tree, and leaving it open upon the others, an effectual cure will generally be wrought. Farther aids to effect a cure of this evil are suggested in the Chapter upon

Ventilation, but attention is called in passing, in order that the evil and its cure may not be overlooked on examining a house.

Another and common cause of smoky chimneys is the thinness of the internal walls of the flues. The air cannot ascend if of low temperature, so the current will not have a proper flow until the inside of the flue has become warmed; hence the obstinate persistence in smoking when the match is first applied, and the necessity for burning shavings or paper in order to heat the flue, to the danger of igniting the soot. An external coating of cement is sometimes applied to remedy this.

#### § 147. Defects in Mouth of Chimney.

A still more usual defect is to be found in the improper construction of the mouth of the chimney, which is often not roomy enough to permit the products of slow combustion to rise unimpeded by the downward current descending from above. In all cases there must be space enough for the mingling of these two opposing forces, and for the conversion of the down current into an upward, by the warmth imparted to it by the smoke and flame. A register grate will to a certain extent effect this by diminishing the aperture for escape of heated vapours, and so leaving space above the flap for the circulation of the air contained within the flue, a cup-shaped chimney seen in most of the houses of Venice will also effect this.

#### § 148. Defects due to bad Workmanship or Arrangement.

Smoky chimneys are well styled intolerable nuisances, tending to try the temper and patience of the inmates of a house; but the cause of the trouble depends upon too many circumstances to permit more remark; briefly, the mischief is to be attributed always to bad construction,

workmanship, faulty materials, and can only be mitigated or removed by special study of each existing case. Once for all, a chimney to draw well ought to be constructed narrow at the throat, just above the fireplace.

**§ 150. Water Pipes and Plumbing.—Water Closets.**

Examine the sinks and water-closets carefully.

In sinks, the trap is rarely ever large enough or strong enough to be of any real use, and is so often uncovered by the carelessness of servants as to be valueless as a means of sanitary relief. It should really be a locked fixture, removable only by special application, and then only for particular purposes of cleansing the waste-pipe. But as this is rarely to be obtained in a ready-built house, all that a careful man may do is to see that the waste-pipe is of large size, the larger the better, and to resolve to make a standing rule that a servant is never to take off the cover of the bell-trap.

The water-closet apparatus must be tried freely, and if the contents do not pass off thoroughly, and the flow of water seems weak, or any other defect appears, do not be satisfied until a competent workman has examined each one throughout the building. Unfortunately the annoyance from these appliances is often not noticed until after some length of time; and if the tenant has "signed and sealed," he is then pretty much at the mercy of his landlord.

Scrutinise closely all the lead pipes that are in sight, and see if there have been many or recent repairs, which indicate leaks probably from bursting during frost.

**§ 151. Cisterns—Rats and Mice drowning in.**

Where there are cisterns within the house, examine their position closely, and if below an upper floor, and left so far

open that rats and mice can readily take them in their runs, insist upon having a wire guard or perforated zinc cover put over them. The decay of a dead carcase will poison the contents of a cistern, and lead to the same fatal results as the daily papers recently disclosed in the case of a clergyman's family, the servant of which had drawn water from a tank that was found to contain the decomposing body of a rat.

**§ 152. Floors commonly Defective.**

*Floors* are rarely laid as closely or carefully as they should be. To say the least, the unsightly openings between each board, the uneven surfaces caused by shrinkage, and the insufficient manner in which they are nailed, causing the ends to spring up, are destructive to carpets, and harbour vermin. Even in otherwise well-finished houses, the floors are not nearly so good as are commonly seen on the Continent, and always in America. But the remedy is what is of present interest.

**§ 153. Shrinking of Floor-boards.**

To fill the openings between the edges, thin strips of hard pine, tightly driven in, will always be found the cheapest plan in the end; and in renting a house even for only three years, it would be well to make some special arrangement with the landlord, to order this to be done, proposing to bear a proportion of the expense; otherwise, the carpets will be cut through long before legitimate wear and tear should permit. Putty and various compositions are often recommended by workmen as cheaper\* substitutes; but when the interstices are large, nothing will be found so satisfactory as the pine strip.

**§ 154. Felt Paper for Deafening.**

Deafening between the floors is not so often used as should be, but as in a house already built this addition cannot easily be made, all that a tenant will care to know is that a good substitute is Felt Paper, which acts as a tolerable non-conductor of sound, and protects the carpets from wear by reason of the unevenness and raised edges of the flooring-boards.

**§ 155. Roof should be Examined.**

Before entering upon an agreement, the roofs of the house should be examined; but as these are under the landlord's supervision, only an assurance that the repairs have been looked to is perhaps necessary. The lead-flashings around chimneys, and cement filletings in cheaply built houses, are frequent causes of leakage, so if there are any suspicious indications in walls or ceilings of the upper floors, it may reasonably be inferred that examination and repair of these is necessary. An experienced man, in whom the intending tenant has confidence, should go out upon the roof and note what broken slates or other defects exist.

**§ 156. Means of Escape from Fire.**

Examination should be made as to the means provided of escape in case of fire, and if it be through a scuttle or trap-hatch on to the roof, the steps or other communication therewith must be forthcoming and tried, or when sudden occasion requires their aid, they may be found deficient in some respect, which makes them absolutely useless. A prudent man will also always have a few fire-buckets kept in some one convenient place near water supply, and a coil of light, strong, flexible wire rope, of which, until the danger is present, no one can sufficiently estimate the

possible value as a means of helping escape from a burning house.

**§ 157. Defective Fittings and Ironmongery.**

The fittings and ironmongery of a house should receive attention. Ordinarily, these are of the very poorest and most common description, but they must be taken for what they are. Every occupant of a house knows that the annoyances of loose door-knobs, ill-fitting window-fastenings, and the like, are the common lot, and they are more or less patiently endured. It seems hard, however, that so much real discomfort should be entailed upon tenants from these little matters, when the saving effected by using such inferior articles is so paltry. In an ordinary suburban house, it has been calculated that the difference in cost between moderately good serviceable fittings, such as would wear well and not get out of order, and the rubbish generally used, could rarely amount to more than three or four pounds at trade prices, and yet how often is this (and, indeed, a very much larger) sum expended by a careful tenant, anxious to have things "comfortable" during his three years' tenancy, in patching up and repairs.

**§ 158. Better Door-handle recommended.**

Of all nuisances, the ordinary door-handle with its shank and screw-hole, out of which the little ill-fitting screw is so constantly lost, is the least excusable. Door knobs, with moveable rims or shoulders attached to the door itself, are so cheap, strong, and pleasant in use, that their absence ought really to be made a reason for declining to take a house unprovided with them. This in time might have the effect of compelling landlords to provide them. In this little matter the house built under an architect, or by an experienced owner, can at once be recognised.

**§ 159. Sash Cords.**

*Sash Cords* are to be tried in every window, for they rarely are in order, are generally not strong enough, often stretched so as to be loose, or in other ways requiring setting to rights. *Bells* the same; and these necessary appendages of a house should be set right before entering upon a term, if only to lessen the nuisance of workmen disturbing the furniture after all is apparently in order.

**§ 160. Tenant expected to keep in Order Fittings.**

The fittings above alluded to have been particularised because they form those parts of a house which a tenant is bound to keep in order, and to deliver in good condition, "fair wear and tear excepted, and injury by fire and flood," on the expiration of the term.

**§ 161. Time required for Testing Fittings. Plumbing should be Tested.**

The good order of these and the plumbing, which may be called the hidden anatomy of the frame, is often capable of proof only after a trial of some considerable time. It seems desirable therefore that some legal means could be resorted to by which a tenant may reserve a power of approval of certain portions of the fittings and appliances of the house until after a stated occupancy. The only practical way to do this would be to refuse to sign until such a time had expired; but as the landlord would insist upon his agreement being executed before giving possession, recourse must be had to the certificate of a competent surveyor as to the actual state of any portions not in order, and a request to the landlord to set them right. If he decline or evade doing this, then the certificate should



be preserved and produced upon termination of the occupancy, and, if a dispute arise, should be settled by referee as stipulated in the agreement.

### § 162. Agreements for Three Years.

*Agreements for three years* are in favour, because they are not so uncertain as a tenancy year by year, nor are they so permanent as a lease. They are often made without the intervention of a lawyer, upon a form which is nearly always in the same words and can be drawn up by an agent. But, simple as such a form may seem, there are points which experience shows may sometimes arise, and which prove the truth of the oft-quoted Italian proverb, "He who is his own lawyer has a fool for his client."

### § 163. Law of "Landlord and Tenant."

The following, which is taken from a little book by W. A. Holdsworth, Esq., barrister-at-law, "The Law of Landlord and Tenant," is worthy of attention. "All leases for terms longer than three years must be by *deed*. In order, however, to avoid the expense entailed by the preparation of such a document, with the usual covenants in full, and by the stamps which are requisite for its validity, it is not unfrequently the practice merely to draw up an agreement for a future lease, containing an outline of the principal stipulations and covenants to be therein contained. Upon this the tenant enters, and to some extent (as, for instance, against any interruption of his tenancy by the lessor) he is perfectly safe; for although at *law* he would only be treated as a tenant from year to year, *Chancery*, which treats an agreement for a lease as an actual lease, would at any time interfere to prevent an eviction, and compel the lessor to carry out his contract. Still in no case where the term is long, or the value of the property at all considerable, should

an agreement for a lease be relied upon; for, if the lessor should choose to sell or grant an actual lease of the property to another party, ignorant of such agreement, the Court of Chancery would decline to interfere against the latter, who would then be able to eject the tenant holding under an agreement merely."

**§ 164. Care in signing Agreements.**

Therefore, for even a simple agreement for three years, or for a yearly tenancy (and it is observable that for the latter there is even a greater necessity for proper safeguards), reference to a competent lawyer is always best, and should not entail expense.

**§ 165. What are "removable Fittings."**

A matter of very considerable interest to a good tenant, who, for the sake of making his house convenient and comfortable whilst his family dwell in it, is tempted to embellish and improve his landlord's house and property, is as to what can be considered as removable fittings on the expiration of his term.

Custom is by no means a sure guide in these matters, and many mistaken notions pass current both as to the landlord's fancied rights and as to the tenant's powers of removal.

**§ 166. Articles enumerated under above Heads.**

The general presumption is that anything that has been affixed to the ground or building becomes the property of the landlord, and cannot be removed by the tenant; following which principle it has been legally decided that trees, shrubs, or plants set out in a garden become the property of the soil, and so cannot be taken away; but this rule is not always binding, for a gardener who uses land for the pur-

poses of his trade may take up all he may plant, and sell it as he pleases. In this latter instance the plants, &c., become "trade fixtures," and are treated accordingly.

A list of those improvements which a tenant would be likely to make in a private dwelling, and which by law would pass to the landlord, may be given as follows:—

*Box Borders* and Plants and Trees of all kinds.

Conservatories—where attached to the house or built up from the ground.

Doors, Locks, Hinges, and Keys. Pipes for water or gas, fixed otherwise than on the surface of walls or partitions.

Glass Windows, unless being supplementary sashes, as of stained or ornamented glass merely fitted to the frames of other windows.

Partitions.

Hearths and Mantel-pieces, unless purely ornamental.

Racks in stables.

Pigeon or Dove Houses.

Strawberry-beds.

Those articles which the law holds to be removable are—

Barns, Granaries, or Buildings set on blocks or pillars.

Blinds.

Cisterns.

Clock-cases.

Cupboards.

Grates.

Iron backs to Chimneys.

Iron Ovens.

Lamps.

Marble Chimney-pieces, if ornamental.

Marble Slabs.

Movable Buildings *laid* on brick foundations not attached thereto.

Ovens.

Pumps.

Ranges.

Shelves.

Sinks.

Wainscot or panelling fixed by screws.

A further list of debateable matters is given concerning which legal authorities differ as to whether they are removable or not:—

Green Houses, Hot Houses, and Frames with glass.

Pavements.

Sheds.

Verandahs and wood or iron Porches.

These items, which have been carefully gathered from "Chitty on Contracts," and submitted to approval of a legal friend, comprise some matters which common information has not contemplated as being in the class which contains them; but it must be remembered that scarcely any general law can apply equally to particular circumstances; therefore in any doubtful case, before acting upon it and opening the door to litigation, it would be well to consult a lawyer and surveyor, and come to some mutual arrangement with the owner before quitting his premises.

#### § 167. Caution as to Outgoing Tenant.

In taking a house that has been occupied, great caution is requisite in undertaking any business transaction with the outgoing tenant in regard to purchasing of fixtures. Nothing should be done without the landlord's concurrence, for a not over-scrupulous person might sell what were stated by him to be *fixtures* which the landlord might claim as his property.

#### § 168. Caution as to Landlord also.

This is a caution which applies to the tenant; but there is another which a landlord should take to heart, and that is, where fixtures have been left (as they often are) by an outgoing tenant with a view to their being purchased by the new, the latter should not be allowed to take possession until their value had been agreed to be paid, or he might insist on retaining them as forming part of what he had

agreed to rent, and then neither the old tenant nor the owner of the house would have a right to enter the premises to remove them.

#### § 169. Dilapidations.

In regard to *dilapidations*,—on terminating a tenancy, the lessee is bound to make good all damage done by removal of any fixtures he may have put up; and if he has displaced any and substituted others, he must replace such as, for his own convenience, he took away, or make equivalent compensation, as may be agreed. Such other damage as may be claimed on the part of the landlord will be determined by the conditions of the agreement and by the certificate or report of the surveyor acting in the tenant's behalf.

#### § 170. Pass no Doubtful Point in Agreement.

But to avoid these unpleasant after-settlements a very careful attention should be given to the clauses of the document before signing it; and if any doubtful point occurs, let it be fully probed at the first, and not left to work evil at the last.

#### § 171. Leases similar to Agreements.

A *lease* for a longer term only differs from an *agreement* in being a *deed*, and containing in full detail the covenants and conditions that are only alluded to in general terms in the shorter instrument. As this is strictly a legal document, no one would think of executing it without the approval of his own professional adviser. The same practical hints as to what should be looked to in the building he is about to enter upon, of course, will be equally in force.

#### § 172. Plan of Drainage attached to Deed.

A remark occurs in concluding this chapter, that it would

be well if a plan of the drainage were always attached to such a deed, not only as evidence, but as a safeguard of a reliable drawing being kept for future reference, which might not be so sure of being preserved if on a separate paper or parchment. This has been before alluded to (10); but attention is naturally called to its necessity in referring to the deed of the house and ground.

## CHAPTER V.

### BUYING A HOUSE—COST OF PURCHASE.

#### § 175. Before buying, ascertain Defects.

WHEN a purchaser has found a house really suiting his purpose, tested by the rules offered for guidance in preceding chapters, it may be worth while to overlook *remediable defects of construction* to an extent that would not be prudent in taking one upon a lease. In a building that is one's own, every pound of judicious outlay adds to its permanent value, but in case of tenancy the improvements made really benefit the landlord more than the tenant, whose enjoyment during occupancy is questionable, and the expense of which is sure to be disproportionately heavy.

#### § 176. Healthiness of Situation.

The main care must be that the situation is suited to the health of the family, is convenient for the purpose intended, is of a scale and cost within the limit, and is sufficiently well built in important and substantial particulars to justify expenditure to meet short-comings.

#### § 177. Twelve Months' Trial desirable.

A safe rule of course would be to "try before you buy," that is, secure a year's tenancy; but if circumstances prevent this precaution, all that has been insisted upon in the preceding chapter should be observed.

**§ 178. Essential Points for consideration.**

First should be ascertained whether the climate of the neighbourhood is likely to suit your family: is it harsh or relaxing? what effects will the air and the water have in a sanitary point? Then, is it a place entailing heavy expenses to keep up, by reason of the number and size of the rooms, the outbuildings, and gardens? or is it so far from a railway station as to oblige the cost of a carriage, not otherwise perhaps necessary? Is the house so distant from market, or so near to a toll-gate or bridge, as to cause a tax on all the articles supplied by tradesmen? Or is the building of such materials as to require frequent repainting and repair? All these questions must be duly weighed before you consent to become a purchaser.

**§ 179. Neighbouring Nuisances.**

Then, supposing them satisfactorily answered, search must be instituted as to whether any nuisances exist or are likely to arise in or near the building.

Of these, most to be avoided are noxious manufactures, slaughter-houses (abominable from their sights, smells, and swarms of rats), bone mills, soap works, brick-kilns in operation, and chemical works. No advantages in a dwelling-house will compensate for the vicinity of these to a family not otherwise compelled to reside in their neighbourhood.

Scarcely less objectionable are barracks, gas-works, and coke ovens. The former spoil servants; the two others fill the air with deposits of combustion too well known in their nature to need remark.

A public cemetery detracts from the enjoyment of a private residence, whether on account of its own lugubrious appearance (and in England it cannot be said "God's acre" is a paradise), or by reason of the frequent passing of funeral



processions and all the unseemly irregularities that attend the return of the drivers and men when off duty and full of beer.

As a minor nuisance, is the frequent striking of a public clock, or a loud-voiced bell on factory or school, yielding only to a railway alarum, sounded perhaps at 5 A.M. and half-past 11 P.M.

#### § 180. Right of Way through Grounds.

A right of way (perhaps close before your front windows) that exists across your grounds, and which cannot be closed or diverted, is also a serious annoyance. So, too, is a boys' school, especially if a productive orchard forms part of the intended purchase.

#### § 181. Sluggish Stream or stagnant Pond.

A sluggish stream or a pond or marsh near to the house are serious drawbacks, and are apt to become positively dangerous, as buildings increase in their neighbourhood, without the most stringent rules as to drainage. The old idea of emptying everything into water, stagnant or running, is too deeply implanted in the rural mind to be readily eradicated, as the odours hanging over our "crystal streams" only too plainly demonstrate.

#### § 182. Cesspools.

*Old cesspools* must be emptied, cleansed by copious lime-washing, and then filled up with dry absorbent soil. All drains which formerly emptied therein or overflowed therefrom must be taken up, and the soil well treated with lime sprinkled over before filling in.

If cesspools in use are allowed to remain (a better system of drainage not being feasible), they should be emptied; and

if the soil is light and easily dug out at the bottom, an extra depth of three feet or more will be advantageous. It is a good plan to put in four or five loads of light dry earth into a cesspool of sufficient capacity; the so doing, in the first place, deodorizes the matters poured into it, absorbs the fluid portions (thereby lessening the danger of pollution of water-springs), and by retaining the volatile constituents makes a more valuable manure when the contents are used on the garden or field.

#### **§ 183. Overlooked by other Houses.**

A house overlooking your own should be a matter of peculiar interest. Its occupants may become good neighbours or quite the reverse; so on social considerations some attention should be given to actualities or possibilities before buying a residence open to neighbourly inspection.

#### **§ 186. Conveniences Internally.**

A house being found which will favourably stand all these tests, the next point is to go carefully through to see how the conveniences and arrangements are adapted to your family and mode of living.

#### **§ 187. Kitchen first care of good Housewives.**

A good housewife will naturally first examine the kitchens and domestic offices, knowing full well that unless the comfort of the servants is provided for she cannot expect to retain good ones in her service.

The kitchen offices should be conspicuous for the handiness of all the several portions in which work is done, for their cheerful appearance, sweetness, dryness, convenient supply of necessary fittings, and above all for their compactness.

The kitchen itself should not have many doors in it, so as to become a thoroughfare, but should be as it were self-contained, and to encourage no intrusion excepting for culinary work. To secure this, the entrance-door from without should conduct into a vestibule, surrounding which doors would lead into the servants' hall, store-rooms, pantries, man's room, and all the other portions of the domestic offices. The kitchen should have connection, directly out of it, with those special appurtenances which cooking operations render necessary. These would be the scullery, or, as it is in some houses, the back kitchen, and which should contain the sink and conveniences for preparing vegetables. From this should be a door leading to the coal-cellar, which regard to convenience will provide specially for the kitchen only, leaving the general coal-cellar to communicate with the lobby before referred to. A cook's closet and small store-room, a pantry, cool, dark, and well ventilated, and a larder should also be attached to the kitchen in such a manner as not to require passing out into the lobby.

#### § 188. Pastry-room.

A light, dry room for pastry is a valuable adjunct to a kitchen in a well-ordered household, and should be more often supplied even in small houses, as it affords great relief to a cook in hot weather.

#### § 189. Housekeeper's Room and Still-room.

A housekeeper's room or still-room may be combined with the servants' hall, in a house of moderate pretensions, providing, however, always a butler's room or plate-cleaning pantry.

#### § 190. Serving-room attached to Dining-room.

In the offices should always be a serving-room, that is, a

pantry of sufficient size so connected with the kitchen and with the dining-room as to admit of the easy and expeditious passage of the dishes. When the offices are upon the same floor as the dining-room, this may lie directly between the kitchen and the latter; and when the former are in a basement, the serving-room should open out from the kitchen and be immediately below a pantry on the upper floor, having a door into the dining-room, the dishes being conveyed thereto by a lift from the lower to the upper serving-room. Plans 11, 13, 14, 18, 25, 26, showing the advantages of such arrangements, are given further on, and may be studied with reference to any special case under consideration. An intelligent inquirer may then see how the house about to be purchased will admit of alteration or inexpensive re-arrangement, to secure what is desired in any particular in which it appears to be deficient.

#### § 195. Servants' Bed-rooms.

Servants' bed-rooms should not form part of the lower offices, unless a man or a boy to protect the premises can be comfortably bestowed therein. Even in such a case, an out-building, with sleeping accommodation for an out-door servant, is on some grounds preferable. Experience now-a-days rather leads to the conclusion that few burglaries take place without connivance of an unprincipled servant. Even without this supposition, it is true that "a little dog and a light" within the house, as Dickens recommends, are more reliable than almost any other precaution to betray the attempts of thieves, or to deter them from making them.

#### § 197. Too large a House an Evil.

The size, arrangement, and number of the rooms, to meet requirements of the family, must then be taken account of. Too large a house is an evil that should be avoided; rather

consider how the capabilities may be increased by future additions, than commence with a building that may involve greater expense than can be conveniently afforded. Much of the justly praised picturesqueness of our English country houses arises from the additions which successive owners have made to the family homestead, and which often result in a peculiar charm, which is unobtainable in a building planned and completed in one operation.

**§ 198. Comfort is first Consideration.**

Do not be caught too readily by an attractive exterior or handsome internal finish : however agreeable it may be to possess a handsome house, with an architectural elevation or picturesque outline, it is far more important and satisfactory to live in a comfortable than in a showy house. Nor need comfort necessarily imply ugliness: a gaunt, bare, plain parallelogram, unbroken in outline and staring in colour, is rarely a well-planned dwelling internally ; the very necessity for squareness and common-place "symmetry" entails such a disposition of the rooms and passages as to destroy all sense of home snugness. A house thoughtfully planned, even if it has not been built under control of an architect, rarely has an unsightly exterior: it is not only that the same judgment which gave convenient, well-disposed rooms and accessories might be supposed capable of imparting good taste to the exterior, but there seems an inherent principle in good arrangement and balance of parts which entails graceful and satisfactory external expression.

**§ 199. Sacrifice no Comfort for Appearance.**

It is a good rule, therefore, in judging of a house that is offered, not to permit the internal disposition of the rooms on any account to be sacrificed to external appearance.

**§ 200. Comfort.—Drafts and Smells.—Remedies.**

The comfort of a house depends very greatly upon comparatively small things. Sometimes the want of these is remediable ; others again are integral parts of the primary arrangements, which cannot be changed without great loss and trouble. Of these may be mentioned faulty position of entrance-doors in relation to other openings, by which draughts arise. When a house has its front door directly opposite to the doors or windows in the rear, or in direct line at the side, no inner screens or swing doors will enable the inmates to enjoy a freedom from draught. The wind finds its way through key-holes and crevices, under and over doors and window-openings, and in exposed situations renders all efforts to keep artificially warmed futile, besides hazarding colds and rheumatism.

When such an external door exists, and the remainder of the house is satisfactory, a thoughtful scheme must be considered whereby the evil can be cured. Sometimes a porch with side-opening, converting the hall into a vestibule, will assist ; but whatever the arrangement may be, to succeed, it must embrace this principle, namely, that under no circumstances are two doors liable to be opened together in a direct line when the outer door is unclosed. If, for instance, the side or back door communicates by a passage with the general or entrance hall, there must be a permanent wall closing the objectionable aperture that before led directly into the front part of the house, and such an arrangement secured of the means of intercommunication as will permit both front and back doors to be open together (as occasion, in fact, constantly requires), without permitting a direct current from one to the other. Plans 16, 20, 23, are cases in point in which these advantages have been secured. By consulting these the mode of cure in any special case will, it is hoped, be apparent.

The next great evil to penetrating winds from without, is the permeating of unpleasant odours from within. Not only exhalations from the drains must be shut out, but the kitchen and scullery should never assert their nearness through the nose ; and it must be remarked, that it is not distance but proper arrangement and due attention to the efficient ventilation and working of the subsidiary drainage that are to be relied upon to prevent these all-necessary parts of a dwelling becoming offensive.

Of course these nuisances result from defective drainage primarily, and are to be met by the proper means detailed in the first chapter (26 to 30) ; but the disposition of doors and passages often assists in causing the currents of bad air to be drawn into the main part of the house. The smell of cooking before the fire, it is, of course, impossible to avoid ; but if too palpable in the hall and living-rooms, there must be something faulty in their connection with the domestic offices. Frequently, too, the kitchen cooking apparatus is in fault ; because, if properly constructed, all, or nearly all, the odours about it should be gathered together and drawn up the flue : and the working of this is important in another view, for unless the current of air sets strongly towards the fire, it cannot do its office of cooking properly.

#### § 201. Screen round Kitchen Fireplace.

A large screen before the fire, rising so high as to entirely enclose the space occupied by cooking operations, is useful. The ordinary "meat screen" is cumbersome and in the way ; in preference an enclosure further from the fire, allowing space within it for the cook to attend to the operations going on, is recommended ; whilst to concentrate the radiation on any one particular part, as for roasting, a smaller polished reflector moving upon castors would be found most convenient. These details belong, however, to another chapter ;

but as suggesting the means, sometimes, of mitigating the nuisance of foul smells, attention is here called to them.

**§ 202. Surveyor's Opinion before Purchasing.**

All the constructive parts of a house, the floors, the walls, foundations, drainage, and the roofs, have been already described, and the tests of quality made apparent: an opinion of a surveyor should be obtained as to the condition of the whole, and the necessary repairs, if any, that should be made before the family inhabit it. A fair allowance must be made for decorative additions or alterations, and the whole estimated amount, together with such extras as legal services, architect's or surveyor's report and professional labours, must be summed up and added to the price asked for the building, before any calculation can be satisfactorily made as to the inclusive cost of the purchase.

**§ 206. Cost of Leasehold and Freehold Properties.**

In calculating the cost of a building offered for purchase, a few of the elements that enter into all calculations may advantageously be considered.

The first consideration is whether the property is *Leasehold* or *Freehold*.

**§ 207. Depreciating Contingencies.**

Leasehold property is usually subject to many depreciating contingencies, and, therefore, is more difficult to appraise than freehold. Of these contingencies the nature of the lease, and the probable ultimate claim for dilapidations on the surrender of the place to the ground-landlord, must be taken account of, as also the condition of the premises at the time, and the amount possibly required to be laid out in substantial or ornamental repairs.



The extent of land, too, must of course be considered, as increasing to a considerable degree the value of the property, and as being less affected by contingencies than the buildings thereon.

### § 208. Value of Land in the Country.

In the country, building leases of any considerable amount of land around a single residence are, however, not common; and when they exist, the value of the ground must be calculated upon its special merits, which vary too much to permit of any positive or general rules.

### § 209. How to calculate Value of Leasehold.

The calculations usually made for *Leasehold Properties* may safely be made upon the following summary, which has been drawn from the tables usually employed by valuers, and will be found applicable to all average cases.

The condition and nature of the property must first be referred to its special class, whether first, second, or third; and this having been done, the ground rent, insurance, and land tax must be deducted, and the reduced rent treated as follows:—

#### *Table for calculating the Value of Leasehold Property.*

|                 |                                    |
|-----------------|------------------------------------|
| 1st Class ..... | 16 years' purchase, or 6 per cent. |
| 2nd Class.....  | 15 ditto, or 7 per cent.           |
| 3rd Class ..... | 12 to 13 ditto, or 8 per cent.     |

### § 210. Houses for Occupancy only considered.

Properties of less value than these are not likely to attract the attention of a gentleman seeking a house for his *own occupancy*, for which purpose only, be it understood, these calculations and remarks are offered. For *investment* many other considerations are necessary, and take the subject into too extended a range.

### § 211. What justifies a "Fancy Price"?

In addition to the value thus ascertained, must be considered whether any circumstances exist which make the purchase peculiarly desirable, and if so, it must be estimated as a "fancy price," and should be treated as money paid for fictitious value, and not recoverable. In the above brief table the ultimate restoration of the capital sunk has been calculated for, allowing money to be of the value of 3 per cent.

### § 212. Calculation of Cost of Freehold.

For *Freehold Property* the calculations made by prominent valuers may briefly be summarized as follows:—

For *Land in the Country*, from 30 to 34 years' purchase.  
 „ in the suburbs, from 25 to 30 „ „

#### *Freehold Dwellings and Buildings.*

|                 |                           |                      |
|-----------------|---------------------------|----------------------|
| 1st Class ..... | 18 to 20 years' purchase, | or 5 per cent.       |
| 2nd Class.....  | 16 to 18 „ „              | or 5½ to 6 per cent. |
| 3rd Class.....  | 14 to 16 „ „              | or 6 to 6½ per cent. |

The same remark as to "fancy price" applies to these.

### § 213. In Estimates, nett Rent must be the Basis.

In estimating the annual value of house property the *obtainable rent*, of course, forms the basis of these calculations, from which repairs and expenses must be deducted.

### § 214. Authorities for Tables given.

The short tables thus given are not offered as infallible guides, unvarying in all cases, but they are such as prudent buyers may follow with confidence. They are taken from more elaborate calculations given by Gwilt and Papworth,

these laborious and careful writers having themselves derived their statistics from the tables of Inwood, of Baily, and of Smart, as also the treatises and formulæ of W. D. Biden and others, and may be found in the 4th Book of the last edition of *Gwill's Encyclopædia*.

**§ 215. Solicitor indispensable as to Title and Transfer.**

The arrangement, construction, situation, and cost of a house being satisfactory, the next step should be to place the matter unreservedly in the hands of a competent solicitor. Questions of title, and all the legal matters appertaining to the transfer of land and house property, are too important to be otherwise managed.

**§ 216. Do not be in a Hurry to Occupy.**

If no difficulties arise, and the transaction is duly completed, it is good counsel not to be in too great a hurry to commence residence. Any necessary repairs, particularly of drainage and plumbing works, and the processes of painting and plastering, can be much more thoroughly and conveniently done when the house is empty.

**§ 217. Useful Hints to Buyers of Modern Houses.**

If the dwelling has been for some time unoccupied, the moving about of workmen inside, with the frequent opening of doors and windows, will do much to make the interior dry and wholesome. It is unnecessary to remind a good house-keeper to see that chimneys are in good order, and all flues thoroughly clean, before any cleaning or finishing is attempted.

Before closing this chapter, attention is called to the following pithy and useful letter, which appeared in a building

journal at the date mentioned, and which a lapse of ten years has not made less applicable now.

"SIR,—The thoughtless *purchasers* of many of the *modern run-up buildings* would do well to view and *examine them while in the course of erection* ; if they were only wise enough to do so, their children and descendants would not have reason to lament the period their parents parted with solid gold for airy fabrics, which scarcely resist a puff of wind, but are nevertheless saddled *with strict repairing covenants* and heavy ground-rents. Let buyers ascertain the following, and they will not become the *dupes of speculative builders and ground-landlords* :—

" 1st. That the foundations are concrete, on solid, not made ground.

" 2nd. That all the materials are new and sound.

" 3rd. That the drainage is separate.

" 4th. That gutters, &c., are lead.

" 5th. That the dimensions and size of joists, sleepers, lintels, rafters, floor boards, quarterings, be had in writing, and no refusal taken. (It is frightful to view the slightness of timber now usually palmed off.)

" 6th. That each chimney arch is supported by an iron bar.

" 7th. That the mortar is sand and lime.

" 8th. What character the estate bears, whether one where, to create ground-rents, the most dangerous structures are run up by builders of no standing and small means, or one where only first-class work and materials are allowed.

" The subject has become serious and important.

" Trusting you will kindly publish this communication,

" I am, &c.,

" May 14, 1861.

" F. E. WHITMORE, Surveyor."



## PART III.

### BUILDING A HOUSE.

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#### CHAPTER VI.

##### PRELIMINARY ADVICE.

AMATEUR PLANS — EMPLOYMENT OF A CONFIDENTIAL  
BUILDER—AN ARCHITECT AND HIS DUTIES—CLERK OF  
THE WORKS—CONTRACTS AND BUILDING AGREEMENTS.

##### § 218. Important Considerations on Building.

THE building of a house may be a life-long satisfaction or a burden of care ; to secure the one, and avoid the other, he that embarks therein must be ruled by what may be epitomized as *Personal*, *Local*, and *Constructional* considerations.

*Personal*.—If a fit and suitable house, ready built, is not obtainable, the alteration and remodelling of one already existing, or the building of a new one, must be proceeded with. Let this then be done in such a manner as to falsify the proverb, that “Fools build houses, and wise men inhabit.”

The first thing is to build according to your means. It is the height of folly to overbuild, and to erect a house that is too large for your mode of life, the number of your family, and out of proportion to your estate. Build in such a manner, that what has been done so far has been well done,

and leave to future years, and improved means, all enlargements and additions, which could only be undertaken at first by crippling your means, or by using poor materials and insecure construction.

Undoubtedly there is much solid satisfaction in building a house upon "one's own" freehold land, in the hope of handing it down as a family home to children and children's children; but to secure this, and escape the depressing weight of debt and overbearing expenses, it is incumbent that the cost of building should bear a just proportion to the means of maintaining the establishment, the steady drain of family outgoings, and corresponding demands.

#### § 219. Conveniences and Comforts.

The next thing is to arrange the house so as to secure the utmost possible amount of internal convenience and comfort. Better sacrifice any external expensive ornamentation (cut stone or the like), than give up anything whereby the pleasure of living is curtailed. It is pleasant to live in a handsome house with an attractive exterior, if means permit, but if, to obtain these qualities, any feature that administers to comfort has to be given up, let the handsome elevation be simplified, as the house after all is to be lived in, rather than merely to be looked at. Besides which, there is a skill that can make simple materials yield a beauty of their own.

#### § 220. Purpose of the Building.

The *purpose* of the building should then be kept in view. The residence of a professional man, as for instance a clergyman, a doctor, an artist, or literary man, requires some special accommodation, which must be skilfully provided; such, for instance, as private rooms conveniently placed in relation to the general plan, and yet capable of seclusion,

with some particular arrangements as to subdivision, lighting, and the like, and a separate external entrance.

**§ 221. For Field Sports or Farm Life.**

The house of the country gentleman, fond of the field or the farm, should also have a character of its own, and some particular study of those portions specially devoted to the owner's own use.

**§ 222. For Sociability.**

The family rooms, too, would agree in size and number with the tastes and mode of life of the family. Frequent meetings for hospitality or for social purposes would require a larger space to be given to the principal sitting-room than a more retired manner of living would render necessary ; so all these general features should be well considered before the first sketch of the plan is made ; and, above all, there should be a clear understanding arrived at, as to what can be most cheerfully and advantageously dispensed with, should the stern test of estimated cost demand curtailment.

**§ 223. Local Considerations.**

The nature of the scenery should serve to suggest the style of the building ; the character of the neighbourhood ought to give the key as to whether the house should share in the prevailing type of residence around. The nearness of a town would naturally indicate closer adherence to suburban arrangements ; and the aspect and temperature of the site would affect the position and relation of windows, porches, conservatories, and other such adjuncts.

The effect that the character of the landscape should have upon a design for a building is difficult to reduce to intelligible rules. English scenery is so varied that scarcely any known type of architecture can fail to find congruity



therewith, in some place or other. The safest rule would probably be to let the external development of just such a plan which the ground, aspect, and size demand, take its fitting shape ; and then as the outlines were broad and unbroken ; or irregular, with projections and recesses, so the character of the exterior would shape itself into symmetrical, or picturesque design.

The former is best represented by classic architecture, or rather by the more domestic style which owes such parentage and which is known as Italian ; the latter, by that which, for want of a better general classification, is called Gothic.

The manner of designing agreeably in any of the varieties of these styles must conform to the true principles of development of plan, legitimate use of materials, and intended limit of cost.

#### § 224. Constructive Questions affect Style.

*Constructional* considerations exercise an important control over the style and even the plan to be adopted. Economy would lead to the selection of materials most conveniently obtained on the spot, provided there were no serious objections on the score of stability to their use.

If materials of better quality or finish are preferred, it must be borne in mind that no sacrifice must be permitted of anything whereby the substantial character of the work would be endangered.

#### § 225. Best Materials the Cheapest.

As a general rule, the best materials are always the cheapest, and in all constituents of a building, the efficient duration of which depends upon the quality of the articles used, and the thoroughness with which the work is done, no parsimony is wise. In building the walls, however, the question of right employment of convenient materials is what is

of the most interest, if a small expenditure only can be afforded.

Thus the drain-pipes, the slates or tiles, the timber, and all inside fittings must be of the best ; but if the stone and brick nearest at hand can be got at a very great reduction in price compared with materials brought from a greater distance, even though they may not be of first-class quality or appearance, they must be used to the best advantage, their defects guarded against, and the character of the work made to suit their honest employment. See previous Sections, pp. 32, 64, 65, 68.

#### § 226. **How to use local Materials.**

If the bricks are coarse, ill-shapen, but hard and durable, and the owner has a fancy for the smooth external surface afforded by cement, there is no objection to make use of it in an honest and unpretending manner. Good taste, no less than a regard to economy in keeping in repair, would lead to the rejection of lavish decoration ; and it may here be said that *unpainted* cement, properly mixed, of good quality, and skilfully employed, is more durable than when otherwise finished. A plain unbroken wall surface, with a projecting roof, showing the natural construction, and extending boldly beyond the eaves, is a mode of building well adapted for the proper employment of cement, and is always pleasing.

Cement thus used adds to the warmth and dryness of a house. Such a treatment would better find expression in an Italian than in a Gothic type, but this must not be taken as an absolute rule.

#### § 227. **Rough Stone.**

Rough stone, such as a particular locality may offer abundantly, and at small cost, may be advantageously employed,

and often with very good effect. The stone should in all instances be employed in such a manner only as its particular nature best suggests ; it should be laid in its natural bed, in thin rather than thick courses, in easy irregularity, suggestive of natural placing rather than of studied affectation of roughness ; and if finer stones are obtainable for use around door and window apertures, the design should be made such as the size, texture, and readiness of working make most convenient and suitable. Generally such materials, so employed, adapt themselves better to the irregular picturesque styles that spring from Gothic, than to the more formal development of classic design.

**§ 228. New Houses in Neighbourhood should be Viewed.**

With these considerations duly working in his mind, the man who seeks to contrive a dwelling for himself and family will do well, before taking any steps towards building operations, to examine for himself houses that his neighbours have put up, so as to profit by their experience. Much time may profitably be spent by so doing ; for there is scarcely a house newly constructed, from which something may not be learnt, if it is only what to avoid.

The more houses that are examined, the better : there is danger in having the mind filled with one ideal, which very often fails in realization to be what imagination represented. A bit here, a bit there, a clever arrangement of some desirable feature, a "happy thought" of one, or a blunder of another, will all leave their useful lessons ; and if they do no more, will certainly show the amateur house-planner that there is more head-work needed for planning a house than popular estimation often allows.

**§ 229. Trials of one who Builds for Occupancy.**

He that builds a house for his *own enjoyment*, in fact,

undertakes a serious trouble and responsibility. He must expect to be made the subject of unsparing criticism, and to be the recipient of much unasked for counsel and remarks. These, it is true, are but small trials; but there are greater ones inseparable to all who venture, especially for the first time, upon bricks and mortar, and which are not to be lightly undertaken.

The capitalist who builds as an investment to improve an estate, can afford to look upon building operations in a business light only; his feelings are not interested, so he is calm and dispassionate, and can enter into his calculations and put the whole conduct of the affair into the hands of his architect or builder, without caring for anything, provided the estimates are not exceeded, and the expected returns by sale or letting are not delayed.

#### **§ 230. Take best Advice before Commencing.**

On the other hand, the man who builds what it is fair to suppose he intends as the home of his family, has many anxieties inseparable from an undertaking so momentous; and as with all matters of business it is well known that sentiment should never be allowed to mingle, he is frequently perplexed with conflicting influences. The only safe rule is:—if obliged to build at all, take the very best advice procurable before commencing.

To do this, it must be understood, in the first place, that the calling in of an architect and surrender of the whole matter into his hands is not indiscriminately advised, but the prudence of associating oneself with an experienced aid is manifest. It may be that the intended house has been a matter of anxious thought and study for many years, and that the projector has sketched out plans of his own, which seem to meet his habits and tastes and the requirements of his family; such amateur plans deserve the utmost

respect, and are generally well worth study. But, well devised as these may seem to be, they are not in themselves all that a builder needs to enable him to erect a house even if their arrangements are compatible with the fixed rules of construction.

### § 231. Consulting a Builder.

Now comes the question—Should the client place these ideas in the hands of a builder and trust to his practical knowledge of the matter to carry them out, guarding himself, perhaps, with such agreements and written stipulations as may appear to him sufficiently protective, or should he submit his sketches to a third person to act between him and the builder—one competent to comprehend his wishes in the first place as to the dwelling contemplated, and able, in the second, to direct the builder how to work them out?

### § 232. Amateur's Plan carried out by Builder.

It is not necessary to remark, that this is not the place to perpetuate any class prejudice against builders, or their "interfering" with the practice of the "profession;" our view, it is hoped, is taken from a higher stand-point, and the question narrows itself into this:—Supposing an amateur capable of devising the plans of what he wishes to build, is it to his interest to carry them out through his builder alone, or to bespeak the intervention of an architect?

### § 233. Troubles caused by Amateur Plan.

Experience shows in every case that can fairly be examined, that an amateur designer fails in the ultimate realization of his ideas where only the practical help of a builder has been sought. This not always by the result being an ugly or uncharacteristic exterior, but by a shortcoming in the appearance of the actual house in comparison

with the ideal; so that it is a singular fact that one rarely sees an amateur house-builder who has contrived his own plans, and employed his own builder for a residence for himself, who expresses himself satisfied with the result of his first experiment; whether he remains content, however, or tries again, depends upon his temperament and his means.

An experienced builder, moreover, will himself tell you that he would much rather work from the plans of an architect, and generally, when consulted by an amateur, will frankly advise him to get his plans drawn out by some member of the profession. This is so true of all really first-class respectable men, even if in a small way of business, that an architect need little fear interference from such in private practice. It is "speculating builders" (for reasons too obvious to detail) that object to employment of a professional man.

**§ 234. Consult Architect, if only to Advise.**

Should an owner therefore have devised plans of his own which he has matured after long study and thought, let him place himself in the hands of a competent architect, *if only to be advised what to do*. It does not follow that he *need* employ him to carry them out in the usual way; but, before submitting them to a builder for estimate or contract, they should be put into proper form, and a written specification (as the technical description of all the requisite works is called) should be drawn up.

Or, if the projector of the house knows a builder in whom he has such confidence as to wish to trust him unreservedly in all matters of construction and cost, then let the architect examine the plans with reference to the site, to the intended cost, and to their practicability, and advise accordingly. These may be placed, when corrected, or fresh

ones completed, in the hands of the builder, who should be instructed himself to frame a specification which may serve as the basis of the building contract. This specification should then be submitted to the architect, and if approved his aid may be considered as to have been rendered to the full extent requested.

**§ 235. Get help from experienced Architect.**

Here a remark unavoidably occurs which touches upon a matter of general and increasing interest. There is a want of a *consulting architect*—one whose office it should be to give advice only, and who would not be expected always to superintend the erection of a building. A capable man who would put himself in the way of affording such services would be a benefactor, and, it is believed would find many clients. For example, an amateur would gladly seek his aid to put into practical shape his own ideas of a residence; the builder would equally seek for well-considered “plans” only, which he could carry out himself, and it would soon be seen that the professional education of a thoughtful observant man stood him in such good stead in giving advice upon all points of artistic design, that an increased respect for the profession itself would be felt. Nor should we hear complaints, now frequently made, that the architect plans a house less *comfortable* than that of the practical builder. This never can occur when the design and control of a dwelling have fallen into competent hands, but unfortunately it is not every architect who has the peculiar gift that fits him for a reliable domestic adviser. He may be an admirable designer, and have a most thorough knowledge of construction, and yet fail to plan a house such as an English family would feel at home in; a special talent is required in a domestic architect, and the more it is exercised the greater value it will acquire.

**§ 236. Work once commenced, Architect must conduct.**

When an architect is employed, it is in preliminary stages that there cannot be too much discussion between himself and his employer: the ideas and wishes of the latter should be elicited as much as possible; where good, should be followed; where wrong, should be shown in what respects they are so, and time so consumed is not unreasonably spent in settling upon the various points to be embodied. The ground, of course, should be studied, and the plan devised so as to embrace all possible advantages of site and aspect, and to mitigate local evils.

But, after the plan has been settled and actual work commenced, it must be distinctly understood the client yields himself absolutely to his professional adviser. For his own ultimate interest no interference with the workmen on his part ought to be attempted, and if he possibly can so far control himself as very rarely even to visit the works in progress, so much the better. The absolute rule should be, as much discussion as you please over the plans, no interference whatever with the works. Only by adherence to this will annoyances be avoided, and the certain liability to large expense be prevented.

**§ 238. A confidential Builder.**

When a man employs a confidential builder to carry out his ideas, the same rule should be followed; for the nonce, the builder is architect also, and if the amateur is a prudent man he will most rigidly abstain from any suggestions whilst the works are in hand, and will turn a deaf ear to any cunning proposals of changes, having a wholesome fear of extras. He will, if a good man of business, make as stringent a contract as he can, and particularly will he be careful that it contains a clause that "no additional works



whatever are to be charged for after completion of the contract, excepting such as are explicitly ordered in writing at the time, by memoranda bearing within them the amount agreed to be mutually paid and accepted in full compensation for the same." In this clause will lie his safety, if he will on his part keep to it; but he must be wary, for many a pleasantly baited trap will be set to entice him within the seductive boundaries of additional works.

#### § 239. *An Architect's Duties.*

When an *architect* is entrusted with the full charge of building operations, his duties are, first, to receive instructions and directions from his client, to visit the site, and then to prepare sketched plans sufficiently drawn out to be chatted over, and to enable him to make a rough estimate of probable cost.

From these, after amendments or alterations have been made, full sets of drawings are prepared, which represent the building in every part, and exhibit to an enlarged scale explanatory details of any portion requiring (in that stage) special elucidation. These are further explained by a carefully written specification, and are, with it, the basis of the building contract.

#### § 240. *Contract Drawings.*

A copy of these is then made for the use of the builder, whose signature is placed upon the original set, which, with the contract (a counterpart of which is furnished to the builder), are retained by the architect in safe keeping, both as originals to refer to in case of dispute, and as the fac-similes, though on a smaller scale, from which enlarged details and working drawings can be prepared and delivered to the builder from time to time as the progress of the work demands.

**§ 241. Drawings for Use of Client.**

These are all the drawings usually requisite; but, to guard against any unpleasant misconception of the architect's right of ownership in his own drawings, it would be well *at this stage* to ask the client if he would like a set of drawings for his *own private use*, and, if he wishes to have them, a copy should be neatly made from the original contract plans and handed to him, a reasonable but moderate charge being made for the labour of preparing them. Were this always done, the public would hear no more of the illogical, although legal, talk about an owner's "right" to the plans he has "paid for," all the writers and talkers thereon seemingly forgetting that without them the architect is powerless to carry out his design. When the building is *finished*, the question may possibly assume a different form; but, during the progress of the works, and until everything has been satisfactorily settled up after completion, they should always remain in the architect's custody. This is, indeed, the only safeguard to the client.

**§ 242. Plan of Drains to be kept.**

An owner should, however, require, and an architect should always furnish, a careful *plan of all drains*, pipes, and such hidden skeletons of the fabric (10); and this should be carefully preserved, and also copied in duplicate upon the Title Deed or Conveyance of the property.

**§ 243. Other Duties of Architect.**

In addition to these services the architect gives personal superintendence to the works in progress as often as seems requisite: in the country, if at a great distance from his office, it is usual to agree beforehand what number of visits he will make. He draws up all contracts, examines and

approves all the work, giving his certificate or order for payment of work actually done as stipulated in the contract, and, finally, carefully goes through all accounts at completion and ascertains whether the specifications and plans have been properly carried out, which, when the case, he so certifies, and, by so doing, releases the contractor from any further responsibility under his contract.

#### § 244. Architect's Pay.

For these services he receives the customary per centage of £5 per £100 as commission upon all the outlay, and also such travelling charges and expenses as he has incurred.

For extra services he receives additional and varying pay, but the above is the generally accepted basis of all professional remuneration.

#### § 245. "Quantities" to be supplied.

In addition to the plans and specifications, it is customary to supply what is called a "*Bill of Quantities*," which is a schedule of every article required throughout the building. From this the contractor frames his estimate, and, as it requires great care and accuracy, it is entrusted to a surveyor who makes the preparation of such documents his special practice. For this two and a half per cent. upon the gross estimate is paid, and, in all cases, it is an outlay well employed, for without such Bill of Quantities being supplied the builder must himself prepare one—for which he will charge indirectly, and add the amount to his estimate; moreover, the client will lose the security he possesses in regard to extras, as in case of any additional works being necessary the contractor is bound by the prices affixed to the schedule, and, therefore, the only point to be ascertained is the amount of such work as has been done.

**§ 246. Scale of Professional Charges.**

A careful list of professional charges embracing every possible eventuality between employer and architect has been drawn up by the Council of the Royal Institute of British Architects, and can be obtained at their rooms, 9, Conduit Street, Regent Street, for three pence.

**§ 248. Clerk of Works. His Duties.**

In all extensive works a superintendent who represents the joint interests of owner and architect is employed, who is called a clerk of the works, who is selected by the architect, and receives pay varying from two to three and a half guineas per week.

The duty of a *clerk of the works* is to see that the building is carried out exactly in accordance with the plans and contract; all working drawings are sent to him and the contractor's foreman takes instructions accordingly. It will readily be seen that a respectable, conscientious contractor is relieved of much care and responsibility on works under an intelligent clerk of the works. All the contractor then has to do is to see that his men have plenty of materials and building appliances, and as for the honesty and good qualities of the work, he will not care who is daily observant of what is going on, as he has a character to maintain, and is equally desirous with the architect's representative that good, sound construction, and materials only are permitted.

**§ 249. Economy in employing one.**

In building in the country, even on a moderate scale, a clerk of the works should be employed; his pay will add but a small amount to the cost, and, if he has been well selected, the saving will be evident in the quality and stability of the building, and in the care shown in carrying

out strictly all the peculiarities of arrangement or construction introduced into the architect's plans.

**§ 250. How Owner should treat him.**

During the erection of the building the owner should remember that the clerk of the works is the local representative of the architect and should apply to him in preference to the contractor, or his foremen for information. Much mischief arises from frequent personal contact with workmen engaged in carrying out a contract, and although the owner may be chatty, urbane and pleasant as an English gentleman is expected to be on his own place, he should be very cautious and not allow himself to be drawn into a discussion on any point connected with the building operations. Should any matter be directly referred to him he must in all cases decline to interfere, or take any personal responsibility and should either leave it to the settlement of the clerk of the works, or, if necessary, make a direct application to the architect.

**§ 251. Beer to Men.**

Another hint as to giving the men individually money or beer ; this should steadily be resisted, for it is a custom, once commenced, most difficult to limit, soon becomes an item of very considerable expense and does little good in itself. If the owner wishes to encourage the men and to secure their good feeling during the work, the best plan is to promise some substantial treat when an important part of the building is satisfactorily completed and by the time stipulated in the contract ; then when the time for performance of the promise has come, to give the men a supper of good meat, pies and pudding, with a moderate allowance of beer. Then, when the whole is completed, a second dinner or supper may follow, to testify to the satis-

faction felt with their conduct and steadiness throughout. Good workmen appreciate such festive recognition of the interest they have taken in their employers' concerns, and as a rule are never the ones to be constantly laying traps to catch beer money.

#### § 254. **Contracts.**

The *contract* made with a builder is simply an agreement to perform the works described in the written specification and represented by the drawings of the house intended to be built. The price is therein stated, and usually the periods are inserted at which various portions are to be paid for as the works go on ; and for the payment of which the architect's certificate is the order upon the owner.

#### § 255. **Position of Owner and Contractor.**

It will be seen therefore that the contract is two-fold, the one party agreeing to perform certain works and by a certain time, the other to pay a certain sum upon production of a document from the architect stating the contract thus far has been faithfully performed. It is moreover usual for the contract to contain a stipulation that in case of certain unavoidable circumstances causing delay in completing the several stages of the work by the stipulated day, the architect may at his discretion release the contractor from the penalty of non-performance of contract in regard to time. On the other hand, in case of inexcusable delay on his part, the architect may enforce a penalty of so much per day or per week for any time beyond the date set forth.

The owner must therefore be prepared to perform his part of the contract by being ready to pay the amount certified for when duly applied to, or he will be liable to be made responsible for a breach of contract.

All that an employer of a contractor must do, is to have

his money ready, and to avoid every possible occasion of being induced to interfere. At the risk of repetition, this cannot too often be insisted on, for of all mischievous sources of after-litigation, extras and extortion, the admissions or remarks of an unwary owner are, in the hands of a shrewd contractor, the most prolific.

**§ 256. No Departure from Architect's Settled Plans.**

The plans and specification being the basis of the contract, the utmost circumspection is necessary in well considering all preliminaries that no changes or departures from the work set forth may be afterwards necessary. Thoroughly know your own mind, weigh well the size, the accommodation, the style and the cost of the house before you commit yourself to its erection. It is better and far less costly to build and alter upon paper than to do so in the more expensive materials used in construction, and if you unfortunately happen to be one of those who cannot know your own mind, nor understand what a building will be until you see it fully drawn out upon paper, you will do well to put yourself in the hands of a patient and clever architect who will suggest and resuggest and cheerfully submit altered sketches and plans until the exactly wished-for thing itself is hit upon. Better an extra and liberal fee for all this unusual reshaping of the sketch plans, than to incur the risk of changes and alterations as the work proceeds, with the annoyance to all parties of putting up and pulling down, and all the recrimination and worry thereby entailed; not to speak of the inevitable long bill of extras when the day of settlement arrives.

**§ 257. Final Authority of Architect.**

If a lawyer has been employed to draw up a contract framed with every protecting clause that legal nicety and

forethought can contrive, it must be remembered that after all the architect is the only real means of securing to the owner what he expects from the builder; it will be in the manner in which the work is done that the attempt to give a less value will be made, and the architect is solely capable of comprehending the fraud and of compelling the due performance of the agreement.



## CHAPTER VII.

### ESTIMATES OF COST OF BUILDING.

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BY THE CUBIC FOOT—BY THE SQUARE—BY QUANTITIES.

**§ 260. A Professional Opinion should be first taken.**

IN all cases the opinion of a surveyor or architect should be obtained as to the probable cost of a building. But where this is not readily obtainable, or, before commencing to build the owner wishes to make calculations of his own, a few rules are given which may serve to assist in reaching the approximate outlay that will be required.

**§ 261. Approximation of Cost.**

To calculate closely, and thoroughly, requires the nicest care, and should be accompanied with experience, for however accurately the quantity of material to be used, and the labour thought to be necessary, in constructing a building, may be set forth, the putting the proper price upon each is a matter of very great importance.

**§ 262. Inaccuracies in Estimates.**

It is common to hear complaints of the uncertainty of professional estimates, but "practical men" are still less sure, as (see "The Builder," every week) the statements of estimates given by builders in the building journals plainly demonstrate. It is not uncommon to find half-a-dozen men vary from three to six thousand pounds as tenders for the same building, and even for those in which "tenders have

been supplied," that is, each builder has had a very full and complete list of everything throughout the building, and has only had to put his price upon each and add up the result, extraordinary discrepancies occur. There are cases in point to prove that this is no exaggeration,\* in the "Builder," "Building News," and "Architect," occurring in almost every number.

### § 263. *Nearer Approach with Quantities.*

From these instances (which are fairly given as average samples of daily experience) it may be gathered that estimates of the cost of a building are uncertain, but that with the assistance of quantities, the range between the two extreme limits is not nearly so wide. Unless absolute correctness has been attained in giving each item of a building and in assigning to it its proper price, a rougher mode of estimating the cost of work by squaring dimensions, as it is called, and allowing a certain amount for each cubic foot or each square of superficial flooring is often more near to the truth, and is all that an amateur should trust himself to attempt.

### § 264. *How to Calculate.*

To make these calculations, much however must be assumed, which after all is by no means certain, and the whole thus resting upon an erroneous basis, becomes of little practical value. An architect or surveyor who has had

\* In the "Building News," May 19, 1871, are tenders for certain works at the Fulham Union Workhouse (one would imagine these to be commonplace enough), and eleven builders offer prices from £4650, the highest, to £2694, the lowest; also in the same paper five tenders are made for work at Weston-super-Mare, the highest being £6982, the lowest £3811. In each of these instances it is not stated that quantities were furnished. In two that are in the same paper, and for which quantities were supplied, one shows tenders from seven builders ranging from £730 to £589, and another from eight, with £2373 as the highest, and £1789 as the lowest estimate.

much experience and has observed the cost of different buildings acquires a mode of pricing the work which leads him to very accurate results when applied to his plans, and generally adopts this formula.

The extreme dimensions of the outside of the building are taken from the plan, which if irregular must be subdivided into parallelograms so as to admit of calculation, and the lengths and breadths are multiplied by each other ; then the height of the main part is taken from the bottom of the foundation to half way up the height of the roof, and each separate height of any addition is taken in the same manner and then multiplied by the dimensions previously obtained which individually apply. All of these are then added together and will represent the number of cubic feet in the building. An allowance must next be made for the class under which the building would fall, whether first, second, or third, and a sum varying from one shilling, eightpence, and fivepence halfpenny allowed, when the result will give about the gross value of the work.

**§ 265. Cost of Buildings of similar Class the basis.**

To apply this mode of roughly estimating probable cost, a great assistance will be found by obtaining the positive expense of any recently finished works in the neighbourhood, which at all resemble in character or extent what is contemplated ; then by ascertaining the correct dimensions, and by calculating them in the manner which has just been described, a sum per cubic foot will be ascertained which, applied to the intended work, will give very safely the probable cost.

In making these calculations every projection from the building must be measured in full.

**§ 266. Examples of different Ratios.**

A row of well-built small semi-detached villas in a respect-

able London suburb accurately measured, proved the cubic contents of each to be 36,784 feet, which at 6d. per foot, gave nearly £920 as the cost; this, with the land worth for each £350, as the price completed was £1350, would be a safe rule as to the allowance of 6d. per cubic foot for suburban buildings of similar class.

A row of others in the same neighbourhood, but poorly built and put up by a speculating builder, when reduced by the same process, gave 4d. as the cost per cubic foot.

In the country, for a building with a plain architectural finish, *sevenpence* may be taken as a tolerably safe allowance for the cubic foot; in some cases *sixpence* would be found enough.

#### § 267. To calculate by the Square.

The other mode of calculating by the squares of flooring is as follows:—

The dimensions of the principal rooms are taken and the one multiplied by the other so as to give their superficial areas; then the secondary and chamber floors are treated in a similar manner, and, lastly, the domestic offices, and an amount per square foot, or generally per square of one hundred feet, that is ten feet each way, is assigned to each. But the same difficulty attends this mode of computation even perhaps to a greater extent, for the sum placed against each square must be guided entirely to what is supposed to be the value of the class of house the building is intended to be.

#### § 268. Professor Kerr's Method.

Professor Kerr in "*The English Gentleman's House*," to which reference has already been made, very properly varies the allowance per square in proportion to the cost, extent and finish of the house, and begins at £40 per square, for

the Family Rooms and £28 for Servants' Rooms, of a house of about the value of £1250, increasing to £100 and £50 per respective squares, in a house estimated at £40,000. (*See* Part V. chapters 5 to 10.)

His plan is to take the dimensions of every room and portion of the house internally, multiplying their relative length by the breadth, then squaring the floor spaces of passages and stairs in the same manner and adding to the total one-fifth of the whole for walls and waste.

The following method reaches about the same results as those given by Professor Kerr, but in a simpler manner.

Take the external areas of each floor in the gross, including all stairs and passages, and ascertain the number of squares by multiplying the length by the breadth and calculate them according to the following table :—

#### § 269. First-class London Houses per Square.

*First-class House in London*, not exceeding 1800 feet superficial per floor, that is 30 feet by 60 feet :

|                               |                 |
|-------------------------------|-----------------|
| Principal Rooms .....         | £50 per square. |
| Chambers and Secondaries..... | £35     ,,      |
| Offices .....                 | £25     ,,      |

Well built *London* or *Suburban Residence*, not wholly detached and not exceeding 900 superficial feet or 22 feet 6 inches by 40 feet :

|                               |                 |
|-------------------------------|-----------------|
| Principal Rooms .....         | £40 per square. |
| Chambers and Secondaries..... | £30     ,,      |
| Domestic Offices .....        | £20     ,,      |

*London* or *Suburban Residence*, plainly but honestly built as an investment, or for very moderate scale of living, and not exceeding 900 superficial feet :

|                        |                 |
|------------------------|-----------------|
| Principal Rooms .....  | £35 per square. |
| Chambers .....         | £25     ,,      |
| Domestic Offices ..... | £18     ,,      |

Examples of the application of these simple tables will be given in the next part, with illustrations of particular plans, and their accuracy will be capable of test by comparing the results with the known cost of such houses as have been built.

**§ 270. Use of above Tables, in fixing size.**

A valuable use may be made of tables such as these, varied in the amount allowed for each square, in proportion as the *size* of the building, or rather the intended *cost*, makes necessary, in ascertaining the amount of accommodation a gentleman can expect in a house on which the outside outlay is to be fixed.

The sum being defined, the architect would be able to hand to his client a list of the rooms, and the dimensions of each, which, treated in the manner that has been described, that amount would allow; the latter then could ascertain if the accommodation sufficed, what were the deficiencies, and what superfluities, and a schedule of internal accommodation might be drawn up which would be of material use to the architect in arranging his design. Many persons say they cannot understand a plan, but any one could comprehend a written list of all the rooms and appurtenances proposed to be provided, and by measuring such apartments as they chanced to occupy or to have acquaintance with, could estimate whether the dimensions suggested would be suited to their taste and wants.

**§ 271. No separate rule for Country Houses.**

No separate rule is offered for estimating houses in the country, for it would be sure to mislead; the simplest mode is to inquire how the average prices in the neighbourhood compare with London prices, then calculate accordingly. Railways, and other facilities of locomotion, tend however

to assimilate the cost of all works to the London standard, and where there is a gain of superior cheapness in one process or material of construction, there is often found an excess in another to compensate, so that the average does not greatly differ from the cost of similar work in the Metropolis.

#### **§ 272. Additions to calculated Costs.**

To all the results obtained by estimating the cost of a house by the number of superficial squares, must be added an allowance for incidental expenses.

These would be professional services, including law charges, extras, special fittings (grates, mantels, and the like), external fences, and boundary walls, some internal decoration, and should not be estimated under twenty to twenty-five per cent.

#### **§ 273. Averages not to be taken in Opposition to Tenders.**

All modes of calculating the cost by averages such as the above are of course but unsatisfactory, and are not to be relied upon in testing the tenders of responsible and fair-dealing builders.

A brief explanation of the process employed in reaching a reliable estimate will therefore be given.

#### **§ 274. Practical Estimating.**

The several processes of building are taken seriatim, and are measured and valued in the following manner.

#### **§ 275. Excavating.**

The digging out of the earth required for the foundations of a building is performed by the cubic yard, that is, three feet wide by three in length and three in depth,

in all 27 cubic feet. The number of cubic yards is ascertained by multiplying the length by the breadth, and then by the depth, treating irregular buildings by convenient subdivisions, and measuring circular work as if it were square. Then to fix the price of this, reference must be made to the nature of the work, and if the soil is so light and soft that a man can throw up a given quantity a day, which is generally assumed as 10 cubic yards, that being divided equally into the wages paid to the labourer, would give the cost per yard for digging only. But if further labour was necessary, and a pick had to be used, an additional man to help the digger will be required, and hence the cost per yard will be doubled; if again more labour is necessary and two men assist the digger, three times the first cost must be calculated.

For removal of what has been dug out, the calculation is made that three men will remove 30 cubic yards per day, a distance of twenty yards, therefore the same principle of calculation will be applicable.

In fixing the price of labour per diem, it must be remembered that the employer's, not the men's price must be allowed, so as to give the contractor his fair profit.

#### § 276. **Brickwork.**

All brickwork is measured and estimated by the *rod*, which is a surface of 272 feet, by a thickness of one brick and a half, or  $13\frac{1}{2}$  inches, and is equal to  $16\frac{1}{2}$  feet square. In finding therefore the quantity of brickwork in a wall, the calculation must be made as to its thickness. If it be  $13\frac{1}{2}$  inches, then the surface of 272 feet exactly contains a rod, but if it be but 9 inches, or it be more than  $13\frac{1}{2}$ , then the surface will be greater or less accordingly.

#### § 277. **Number of Bricks required.**

The average number of bricks calculated to be required



in building a rod of walling with fair joints is generally taken as 4500, but as bricks vary in size this is not always absolutely the case, and in calculating the number required in a dwelling-house so as to allow for waste, &c., 4540 is a safe allowance.

In measuring brickwork, no deduction is made for the space occupied by flues, bond timbers, and the like.

Apertures are deducted, but the angles are measured by the foot run.

#### § 278. Lime and Sand for Mortar.

The *lime* and *sand* forming the *mortar*, are separately estimated; a rod of brickwork requires 1 cubic yard of best stone lime, or  $1\frac{1}{2}$  of chalk lime, and  $3\frac{1}{2}$  loads of sand to make the requisite quantity of mortar. Cement is charged for by the bushel.

#### § 279. Cost per Rod.

It is customary to allow so much per rod of brickwork for the mortar, labour, and scaffolding, which varies according to the quality of the bricks.

Hence with bricks at £1 10s. per thousand, and 4540 per rod, from £3 3s. to £4 4s. per rod is added, and for bricks at £3 and upwards per thousand, from £3 10s. to £4 10s. is allowed.

It becomes then comparatively easy to estimate the cost of brickwork, knowing the price per thousand of bricks delivered upon the ground, the fair sum for payment of which would be for bricks, at say £1 14s. per thousand, from £10 10s. to £12 per rod, other prices in proportion.

#### § 280. Concrete.

*Concrete* for foundations will require 1 cubic yard of gravel and sand and 3 bushels of cement to make a cubic

yard, the materials losing nearly one-third of their bulk when made up.

#### § 281. Facing.

*Facing* with bricks of a better quality, and *gauged* arches are measured and charged for by the foot superficial, and require 7 bricks to the foot for the former, and 10 for the latter.

#### § 282. Paving, &c.

*Paving* is charged by the foot, or if of brick by the hundred or thousand. The other materials and appurtenances furnished by the bricklayer, are charged for by the foot or so much a piece.

#### § 283. Timber, Joiners' and other work.

The *timber* and *joiners'* work of a house is the subject of very close and intricate calculations, and cannot be explained without more of technical detail than will be either interesting or useful. The plumber, slater, painter, paperhanger, smith and ironfounder, have each to be detailed by careful enumeration of every article to be used upon the building, the prices affixed, and time and labour allowed for. It is scarcely possible to carry the general reader further than this mere glimpse of what is required in fully estimating the cost of a dwelling by enumeration of its component parts; but to show the manner in which this is done, the following summary of a bill of quantities of a building with the prices duly carried out is given.

#### § 285. Example of Building.

The plans of the building are represented by illustrations 21 and 22, Chapter 9, and are of a moderately sized and conveniently arranged detached house, erected a short

distance from town by Mr. John S. Quilter, Architect, the quantities having been taken out by Messrs. Quilter, Surveyors.

The brickwork, which was required by the specification and contract to be built of best sound hard-burnt stock bricks in mortar composed of one part of fresh stone lime and two parts of clean sharp washed river sand, is estimated at £11 2s. 6d. per rod, with extra allowance of £2 5s. 0d. per rod for that in Portland Cement, and of 1s. and 9d. per foot superficial for red brick facing, colour and Tuck pointing; also of 2s. 4d. per foot for rubbed and gauged arches and pointing to doors and windows.

*General Summary.*

|                                                                                              | £      | s. | d. |
|----------------------------------------------------------------------------------------------|--------|----|----|
| Excavator and Bricklayer . . . . .                                                           | 930    | 11 | 6  |
| Mason . . . . .                                                                              | 104    | 14 | 6  |
| Carpenter . . . . .                                                                          | 257    | 6  | 3½ |
| Joiner . . . . .                                                                             | 274    | 14 | 7  |
| Plumber . . . . .                                                                            | 57     | 12 | 0¾ |
| Smith and Founder . . . . .                                                                  | 65     | 11 | 3  |
| Slater and Tiler . . . . .                                                                   | 146    | 3  | 4½ |
| Plasterer . . . . .                                                                          | 126    | 0  | 9½ |
| Ironmonger . . . . .                                                                         | 33     | 18 | 10 |
| Glazier . . . . .                                                                            | 51     | 14 | 6  |
| Painter . . . . .                                                                            | 55     | 9  | 4½ |
|                                                                                              | <hr/>  |    |    |
|                                                                                              | £2,103 | 17 | 0½ |
| Surveyors' Charge for Estimating and Preparing<br>the foregoing quantities, 1½ per cent. . . | 30     | 3  | 0  |
| Paid for Lithographing Bills thereof for Tenders . .                                         | 4      | 17 | 0  |
|                                                                                              | <hr/>  |    |    |
|                                                                                              | £2,138 | 17 | 0½ |
|                                                                                              | <hr/>  |    |    |

To this must be added the architect's and legal charges as also an allowance for decorative extras, bringing the whole cost of the building to £2500, which would be a fair average of the outlay sufficient to erect a similar residence in almost any part of England.

This bill of quantities occupied twenty-five folio pages closely written, and would require more space than the reader would care to see bestowed, were it printed in full.

**§ 286. Results applied to preceding Tables.**

The house itself will be found fully described in Chapter IX., and is a good example of an unpretending English country house of moderate cost. Calculated by squares and by cubic feet, the result is £2200, allowing £30, £25, and £18 for the principal, chamber floors, and offices, and at 6*d.* per cubic foot the total is £2150. These are therefore reliable bases of similar calculations for other houses of like extent and finish, adding the extra charges incidental to all buildings for professional services.



## PART IV.

### THE HOUSE AS IT SHOULD BE.

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#### CHAPTER VIII.

##### HOUSES IN TOWNS.

HAVING noted the precautions to be observed in hiring, buying, or building a house, what the house itself should be remains to be considered.

Houses occupied as residences in large towns will first be remarked upon, taking as a convenient illustration the ordinary London house, such as may be seen by thousands in the streets and squares of the metropolis, the London house differing in no respect, in any essential point, from the private residences of any other large town.

##### **§ 290. Barely under private Control.**

The erection of a London house rarely comes within the experience of a private gentleman, unless he happen to be the landlord, or holds upon a very long building lease. In such a case, or under whatever other circumstances the occasion of building might arise, he would not be likely to willingly incur the responsibility of commencing without placing himself in the hands of competent advisers.

The questions connected with building in a metropolis are complicated and important; they involve disturbance of real or assumed rights of neighbours, of interference with

constituted authorities, of compliance with Acts of Parliament, and, in fact, present difficulties so numerous, and often unexpected, as to deter any one from acting without professional advice.

**§ 291. Builder and Surveyor competent Authorities ;  
but Architect necessary.**

So far as practical matters are concerned, a responsible and experienced builder would suffice, and with due reference to the District Surveyor or corresponding official, the building could be substantially erected, and all the legal formalities properly arranged. In five private residences out of six, built in London, an Architect proper is not consulted, and this is probably one of the reasons that the unmeaning uniformity of such buildings, and their general inartistic treatment both as to interior and exterior, are so open to criticism. Certainly in such recent cases in which architects of reputation have been employed, a variety at all events both of architectural character, and, though to a less extent, of internal plan, have been the result.

**§ 292. Usual Type of Houses.**

The old respectable parts of central London are nearly all covered with houses of one unvarying type, but although many of them are well and substantially built, and are frequently handsomely decorated within and without, they fail in skilful or even convenient planning. Those which succeeded them, even up to the present day, are often very ugly and are rarely even well arranged.

**§ 293. Suggestions for Improvements.**

It is the custom to speak and to think of these as "comfortable ;" but the fact is, the genuine Englishman so loves his home and its belongings, that he gives even the most

uncouth arrangements a certain charm, by investing them with individuality, and nameless and numberless evidences of habitableness, so that our houses which have been long occupied by the same family, appear pleasant to the visitor. Of such houses contrast one thus lived in, with its empty neighbour, and then the bareness of the uncared-for plan becomes evident.

Thought seems to have been wanting, even in cases where money had plainly not been spared, and, although the general tastes and wants of the average English family are about the same, and consequently much variety cannot be looked for, it is possible that were plans of town houses presented, suggesting better modifications of usual arrangements, or some novel features, they would, if meritorious, meet a ready acceptance.

A few ideas occur which may not be unwelcome, and in offering them, all allusions to external appearance or questions of style or finish will be studiously refrained from. In this section, internal arrangements and their effect upon health, convenience and comfort will alone receive attention.

#### § 294. Town Houses insufficient in Depth.

In the first place, London houses of moderate rental, and intended for a commensurate scale of accommodation, are usually *not of sufficient depth*.

The probable cause of this is to be found in the darkness of the atmosphere, which renders it difficult to illuminate the far end of deep rooms in the short days of winter, and also in the desire to make the best of the small back yard in the way of garden.

The difficulty of lighting can be overcome by a better arrangement as to windows, and especially of their curtains and other drapery; also by giving the rooms greater height,



and by selecting colours less absorbent of light than are usually employed upon the papers or painting of the walls. The back yard is rarely made any beneficial use of as it is, as the neglected, dismal little squares of moss-encrusted gravel, stunted box, and unproductive beds of mould, plainly show.

Unquestionably it would be better if the depth of town building-plots was greater, so as to leave more air-space between the backs of the rows of houses; but taking them as they are, the small enclosure behind a dwelling cannot be made of any practical or ornamental use, even when they are left the utmost extent that the cramping of the rooms within the house will permit.

A small well-dried and well-drained space, paved with a clean, non-absorbent material in the rear of a town-house, would give a better sanatory result than a larger surface as ordinarily bestowed.

The advantages of greater depth are, of course, in the first place, larger rooms, and this is a special consideration when applied to the chamber-floors, for increased air-space in a sleeping-room is invaluable. But not only will greater space for each room be available, but ampler provision can be made for toilet accessories, store rooms, linen closets, and the like, without encroaching on the apartments or occupying situations that would be more favourably used. Our American cousins have from the first recognised this advantage, as the town residences of New York, Philadelphia and Boston show; the English model may be seen tolerably faithfully followed in the houses built the early part of this century in the older parts of those towns, but in all of them, even in the oldest, a very much greater depth was given to the plan than prevails here.

But the necessities of domestic life speedily induced very marked departure from the original parent plan, the first

change arising from the difficulty of procuring servants, and the advantage of concentrating domestic arrangements upon one floor; hence the family living or dining-room soon took the place of our front kitchens; and as the basement was thus an important part of the house, the level of the principal floor was raised, and a lofty flight of stone steps, usually wide and handsomely furnished, led up to the entrance door. This, in New York especially, became so marked a feature, that the roomy portico over the landing of the door steps retained the old-fashioned arrangement so beloved by the Dutch settlers in that city, and the "High Stoup," or front porch, gave its name to houses thus raised above the pavement level.

Then as the necessities of building compelled the basement (thus partly above ground) to extend its walls deeply down to obtain solid foundation, the sub-cellar under the whole became usual, and this arrangement prevails to the present day, and in it are placed the warming apparatus that heats the entire building, the ice-closets and refrigerators, cool larders, store-rooms and other useful adjuncts to the domestic offices, which require little light, and are best when below the general level.

The arrangement, therefore, of the average American house of twenty or thirty years ago, was as follows: dining-room in basement in front; next it, serving-room and large store-closets; in rear a kitchen—usually divided by piers from a laundry in the extreme back of the house. The hall contained the staircases, and at rear end numerous cupboards and store-closets, water-closet, and (generally) servants' bath-room.

On the floor above, the whole space was devoted to long and lofty reception rooms, with a large apartment across the end, called in common parlance the "tea room," and serving as drawing-room, music-room, or in some cases, company dining-room, as the tastes of the occupants preferred. In

rear of this again, was invariably an enclosed piazza, with steps to the garden or yard in the rear.

On the floors over the bed-rooms were (and are) always of large size, with bathing accommodation and toilet-closets provided for each room in the centre of the house, light and air usually being obtained by a small shaft carried up to the roof.

### § 295. *Special Plan, with Illustrations.*

This common disposition of the plan of an American house is not without useful application at home ; plans are here offered (illustration No. 1) of one erected by the author in Philadelphia during a residence in the United States, which possesses the most desirable of the features above detailed.

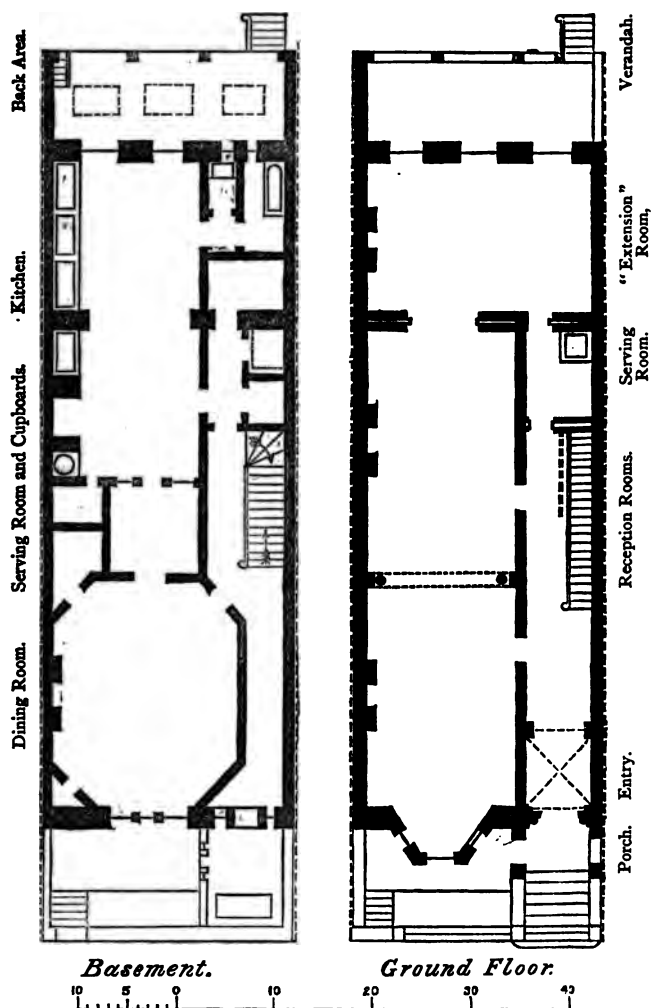
The plot was 25 feet frontage by 100 feet in depth, the invariable area devoted to what is called a "city lot."

The extreme depth on the basement and principal floors is 78 feet, including the piazza, and of the bed-room floors (of which there are three) 50 feet.

In the basement the dining-room is 20 feet wide by 25 deep, and is octagonal, the corners being cut off to obtain more space for the room by curtailing the passage (which is only used by the servants and tradesmen coming to the house), and at the same time not to contract the doorway and its side lights. A fire-proof safe occupies one of the front corners, and from another a door opens into a large private store-closet. The other portions of the plan follow the general description previously given. Servants' bathroom and water-closet are provided on this floor.

The principal floor comprises two long rooms, each 25 by 15 ft. 6 inches, with columns between ; the extension or tea-room in the rear, and back of all, the enclosed piazza

made with close panelling as high as an ordinary window



No. 1.

breast, and with venetian blinds working in grooves between the pillars that support the over-hanging roof. Between the end of the reception-rooms and the rear apartments, are wide sliding glazed doors, which, when opened, do not show, the opening extending nearly to the cornice. There is at the end of the hall a serving room with lift to a closet below, for use in entertaining company.

The bedroom plan represents two large bed chambers, back and front, with dressing-closets between, lighted by a well, and at each end of the hall small rooms, that in front being a single room, and in the rear, a general bath-room and water-closet. Each floor is similarly arranged. The dressing-closets are very completely fitted; on the right are wide drawers, and above are wardrobes, but of full size and with every contrivance that ingenuity can devise for hanging and placing dresses; upon the left is a bath with shower over, and a marble wash basin; a large cheval glass forms part of the fittings.

#### § 296. Cost.

The cost of this residence, built very substantially, finished throughout with hard polished woods, and fitted with heating and ventilating apparatus, hot and cold water to every dressing-room, gas pipes, speaking-tubes, &c., throughout, the exterior faced with cut stone, the floors all double—in fact built in the best manner, and of the best materials—was about £7000 of English money, the land upon which it stood being worth then about £2500. At the present time I learn the house and ground are worth nearly £16,000, the great increase being due principally to the rise in value of the land.

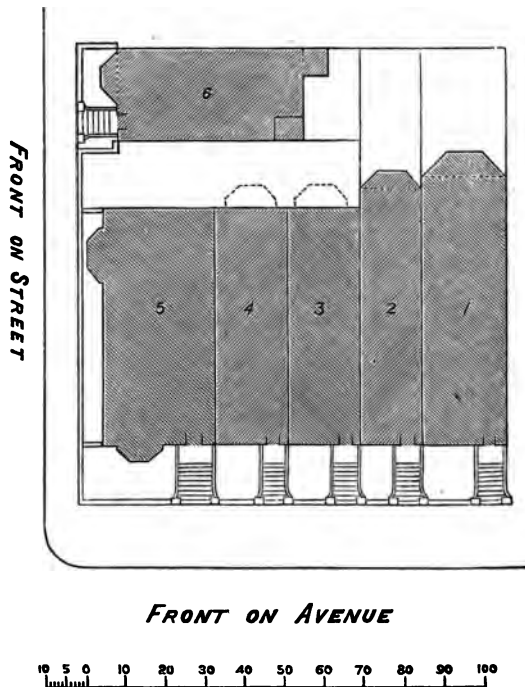
#### § 297. Features worthy of adoption.

Some features of this, and similar American plans, are

worth introduction into our London buildings ; the octagonal planning of the dining-room, giving as it does so fair a space for the front door, removes a frequent objection that builders of small houses are compelled to devote a very narrow allowance to the entrance passage.

§ 298. **Block of Six Houses, New York.**

Another type of American houses is offered (see this and page 137, illustrations 2 and 3).



No. 2. Block Plan of Six Modern American Houses.

These are a block of six houses on one of the corners of

the 5th Avenue, the most costly and fashionable situation in New York. They are from the designs of Mr. Charles Duggin, an English architect, who has been able so to gain the confidence of his clients as to act as architect and builder, having entire control of all the work and the men.

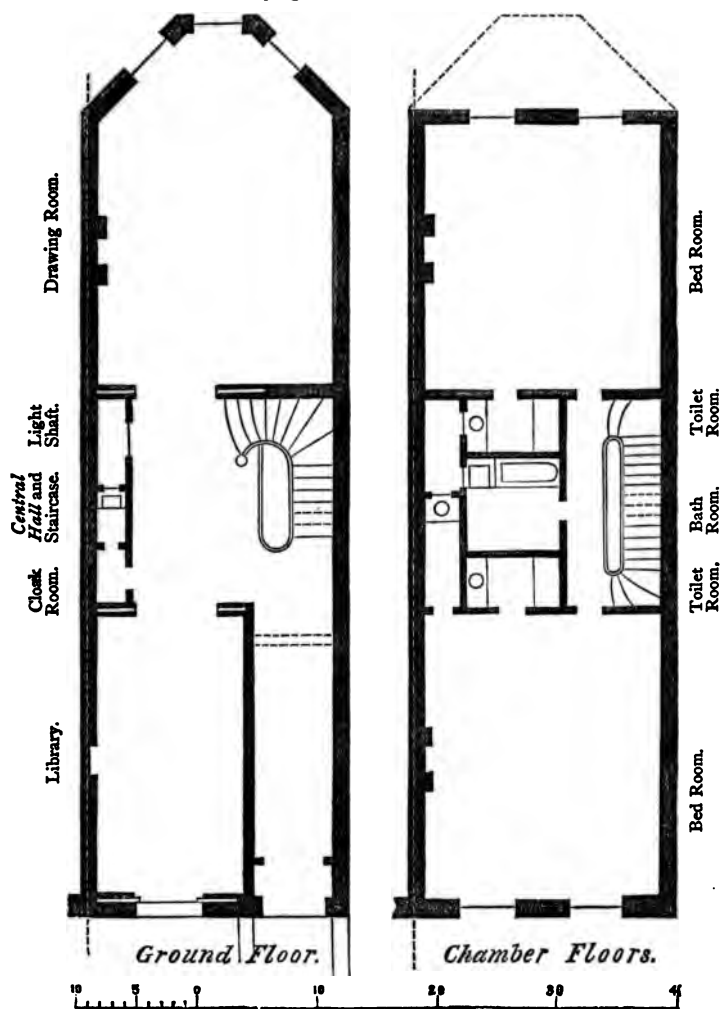
The block plan shows five houses fronting on to the 5th Avenue, and one of smaller size facing towards the street; although each of these houses exhibits some speciality of planning that stamps it as American, the first one—number 1 on block plan—is the only one of which the arrangements are proposed to be detailed.

The block extends the usual depth, namely, 100 feet, and the houses are of varying frontages. No. 1, is 20 feet 8 inches; No. 2, 16 feet; No. 3, 18 feet 4 inches; No. 4, also 18 feet 4 inches; and No. 5, is 27 feet. The house on the street, No. 6, is 24 feet front by 50 feet in depth, exclusive of the rear projection.

No. 1 has a depth of 67 feet 6 inches, prolonged 7 feet 6 inches by the truncated projection. It comprises sub-cellar with heating apparatus and the other conveniences, usually seen, before described; a basement, a principal and three chamber floors. Plans of the basement, principal, and one bedroom floor are given.

The basement has the dining-room 15 feet 10 inches by 24 feet in front, between which and the kitchen is a space of about 22 feet, devoted to butler's pantry, with sink, china and glass closets, private and general store-rooms, and a vestibule leading to the principal stairs to the upper floor. In the rear is a large kitchen, 28 feet in depth by the whole width. This contains washing trays, so as also to serve as the laundry. The seclusion given to the vestibule by the partition separating it from the lower passage is skilfully obtained; in fact the space is made the best use of upon this floor. Light is obtained seemingly only by glazed doors with panels over, between the butler's pantry and kitchen,

and by what would come down the well of the principal staircase from the skylight on the roof.



No. 3.—A Modern American House.



The principal floor has (until recently) a novel feature for an American house, in the introduction of the spacious central hall which contains the first flight of the staircase, and as the library (in front) and the drawing-room (in the rear) have sliding doors leading therefrom, the hall is probably intended to form portion of the suite of apartments made available for entertaining. In the hall is a cloak room, forming an ante-room to a water-closet, each of these being lighted and ventilated by shafts rising up to the well, shown upon the upper floor.

The chamber floors are divided into 2 large rooms each on the principal and next storeys, and 4 in the upper. The plan exhibits the arrangements for bathing and dressing bestowed in the centre of the house, the rear room having wardrobes on either side of the alcove for the bed, to compensate for the larger space given to the dressing-closets of the front room, and which are lighted by a well extended to the roof.

All these houses have been built thus :—

All the floors are double, and deafened with thick felt paper, and those of the principal rooms over the kitchens have extra deafening of cement mortar. The floors of all pantries, bath-rooms, and closets are of hard wood in strips only  $1\frac{1}{2}$  inch wide. All the water-pipes are of patent tin-lined lead. The wash-tubs and tanks are all of slate. The stairs are all of hard wood from basement to upper floor. All the wardrobes and toilet-closets as well as the bath-rooms are of hard wood. The party-walls are all two bricks thick of hard-pressed brick.

All the houses are heated by moist-air furnaces, or by hot water. All of the houses have hot-air registers up to the fourth floor, with drying-closet, linen-closet, and housemaid's sink to each.

All the doors, and all the woodwork and wainscoting to the halls and principal rooms and stairs, are of hard

wood, polished and manufactured by first-class cabinet-makers.

All the hinges and fittings are of extra quality designed expressly for each house, those for the principal floors being of bronze, and all have large mirrors in the drawing-rooms and libraries. The price of these houses ranges (including the land), from about £12,000 to £18,000, the one that has been represented on the plans being £16,000, the cost of the land reaching in each case about two-fifths of the whole.

**§ 299. American Houses usually have Reception and Family Rooms on one floor.**

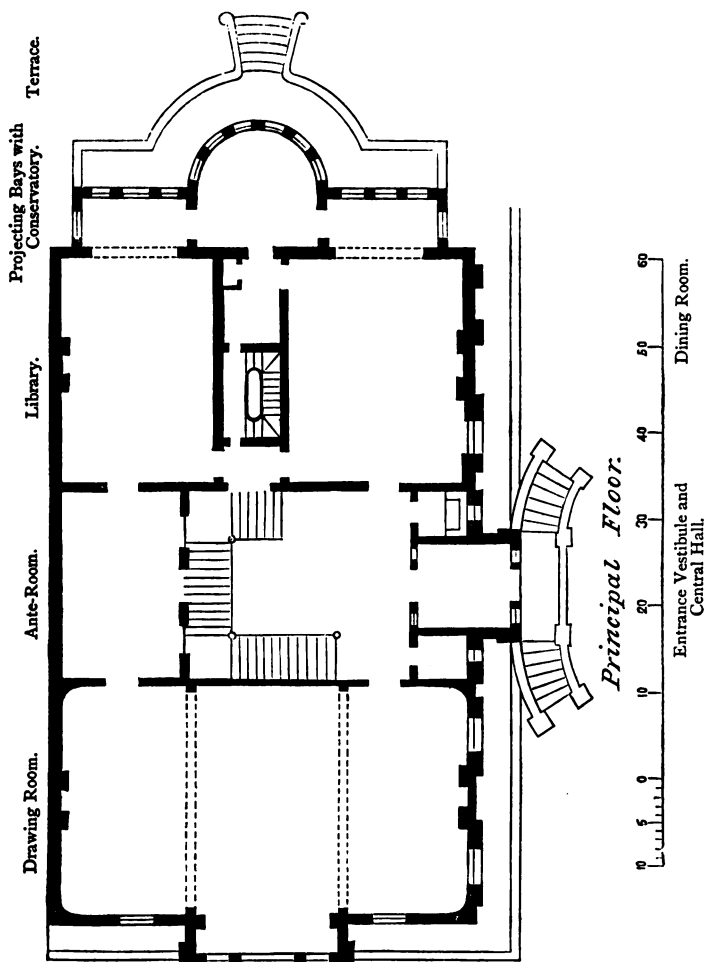
American houses rarely adopt our London plan of placing the drawing-rooms themselves on an upper floor, devoting the ground storey to the general sitting-room, library, or dining-room, and by not doing so they practically lose a floor for which the partial use of the basement for a dining-room or breakfast-room, or, as in some cases, a billiard-room, scarcely compensates. It is true there are often seen in New York and elsewhere, what are called "English basement houses," which give the family apartments upon a level with the street, and the reception-rooms upon the floor over, but they are generally upon a small scale, nor is the ground floor disposed in accordance with English modes of life. Even in very large houses the Americans adopt rather the Parisian than the London model, and dispose their family rooms and salons for company upon the same floor.

**§ 300. Plan of a New York House, by the Author.**

An example of the principal floor of a spacious New York house by the author is given, which is a case in point. (See Illustration, No. 4.)

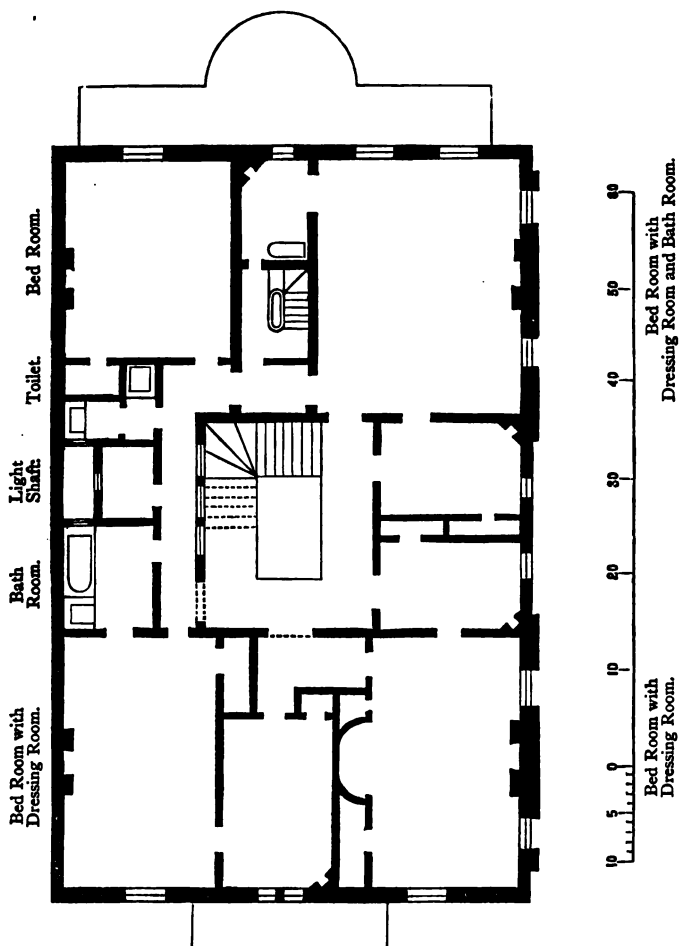
The house was on the corner of two wide streets, and occupied a square of about 50 by 80 feet with a garden at

the rear, beyond which a farther space of 50 feet square was occupied by stabling.



No. 4.—New York House.

The plan shows a simple disposition of the rooms and



*Bed-room Floors.*

No. 5.—New York House.

necessary adjuncts; the entrance doors, which are approached by a double flight of curved steps, open into a square vestibule, upon one side of which is a retiring room, and upon the other a closet of similar size for cloaks and hats. The drawing-room occupies the whole front, and is 26 feet deep by about 46; leading from this is an ante-room lighted by an ornamental glazed screen at the end of the staircase hall, and in the rear is the library, 26 by 18.

The dining-room, 26 by 21, forms the remaining suite of rooms, and a serving-room, servants' staircase, and inner lobby conducting to the library, with the large central staircase hall, fill up the rest of the plan. The dining-room and library are extended by large bay windows, the sides of each of which open into a conservatory, all of these conducting to a terrace and flight of steps leading to the garden.

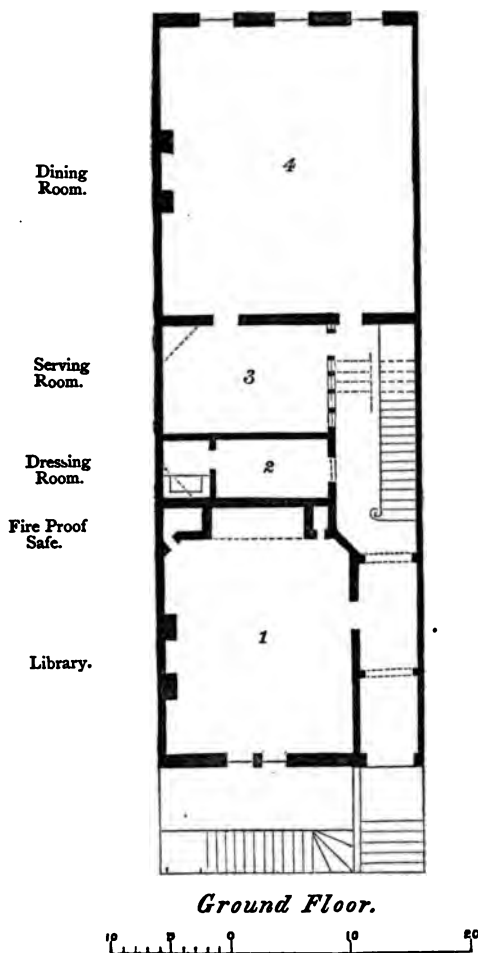
Under the drawing-room is a billiard-room of the same size, with a separate flight of steps leading thereto, arranged beneath the principal staircase in the central hall. The hall is lighted from above, and the bed-room floors are three in number, with an attic (under a mansard roof) for servants. Of course in a building of such area there was ample facility for arranging spacious sleeping rooms with every convenience. The cost of the building would about equal £21,000 at the present day.

### § 301. London House with greater depth.

The advantage of increased depth for our London houses may be seen by plans of the ground floor, drawing-rooms, and chambers offered in illustrations Nos. 6, 7, 8, pages 143 to 145. The house has the usual small frontage of 22 feet, and upon the ground floor the entrance passage and external door are in the customary position at the side.

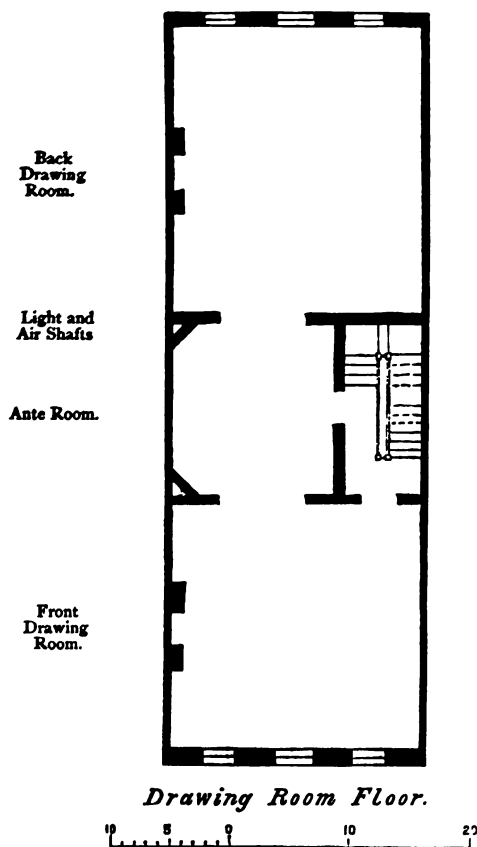
In front is a library, No. 1, about 15 by 20 feet, with

a deep recess at rear end, and a fire-proof safe of small size built into the angle of the wall, which is planned to



No. 6. - London House.

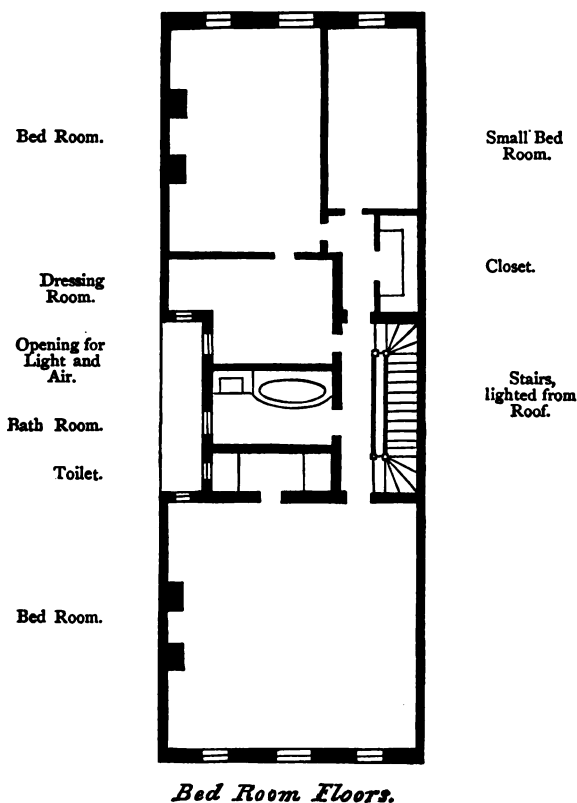
correspond with the corner cut off to obtain the necessary enlargement of the hall for the stairs.



No. 7.—London House.

In the rear of the house is a dining-room of larger dimensions than usual in houses of such a frontage, 24 feet deep, and the entire width of the house. Next to this is a

serving-room, No. 3, partially lighted by a glazed partition towards the hall and by an aperture in one corner of the



No. 8.—London House.

ceiling down which the light would pass from a well exhibited on the plans of the floors above. No. 2 is a dressing room with an inner water-closet; the latter lighted and aired



by a shaft similar to the one before alluded to. A ground glass door is the mode of obtaining light to the dressing room, but as this would generally be in request in the evening, artificial light would be mainly relied on.

The drawing-room floor shows large rooms back and front, and between them an ante-room, the truncated corners of which form the walls of the light and ventilating shafts communicating with the ceilings below. The sizes of these rooms are 24 feet depth to the rear drawing-room, and 21 to the front, each of them the full width of the building between its party walls. The ante-room has double doors with glazed panels between each drawing-room, and openings for ventilation at the ceiling into the corner shafts.

The chamber floor plan will be readily understood. A recess is formed in the centre for light, and around it are dressing-rooms to the rear bed-room, a bath-room and water-closet, and a dressing-closet attached to the front room. There are three bed-rooms upon this floor, and also a spacious linen or store closet at the end of the staircase.

The stairs are lighted from the roof; above this floor are two others similarly divided, giving six large sleeping-rooms, three smaller, and three dressing-rooms of equal size to that in the rear of the back bed-room, with box-rooms, soiled linen closets, and similar conveniences upon the top floor.

The building thus arranged occupies a depth of 62 feet, and the space left in the rear of the lot would be best treated in the manner before so urgently insisted on, namely, as a dry paved court, with flowers in boxes and pots in lieu of garden mould or turf. The *cost* of such a house would depend entirely upon the character of the internal finish; it would be plainly but substantially built as to walls, roof, floors, partitions, windows and the like, for £1800; and from £500 up to any amount the wealth of the owner permitted, would be required for the finishing and fitting.

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**§ 302. Suggestions for Altering existing Houses.**

This plan offers useful suggestions as to alteration of existing houses, whereby increased accommodation may be obtained, leaving moreover the front part and the exterior almost untouched.

**§ 305. Plans of Town Houses in Pairs.**

In building a new house in London on a site permitting space for greater frontages than are usually devoted to residences of moderate rental, the following plan is recommended (see Illustration No. 9). It is suggested that houses in a street or row should be built in pairs, not in continuous series, with a party wall between each. Between each pair a narrow space should be left for light and ventilation; each house would therefore have a party wall in common, and external walls against the outer space.

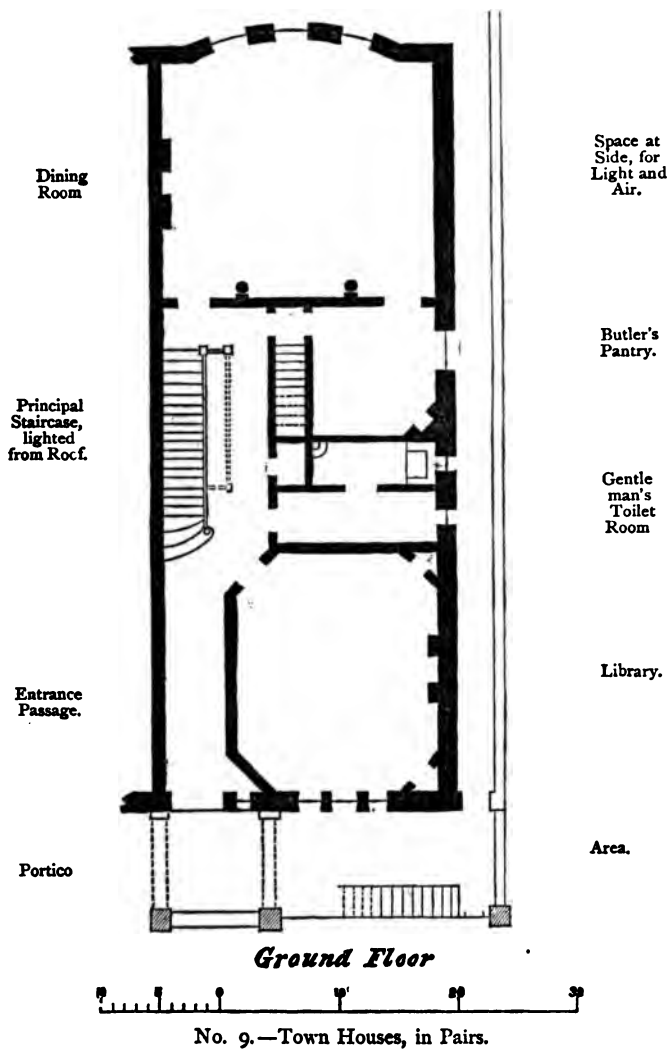
The danger from fire would be considerably lessened and the side area would afford opportunity for obtaining valuable light and air, which would permit a great depth to the house and allow bed-rooms and other accommodation on a liberal scale.

The architectural effect of a row of houses thus broken into pairs would be superior to what can be attained with present arrangements,—the necessary continuity could be preserved by arches or other features between each pair; this is however so obvious as to need no farther remark.

The expense would be of course somewhat greater, but principally on account of the additional ground occupied; in new neighbourhoods, however, it would be well for capitalists to consider the advantages this arrangement would secure, and which occupants would readily appreciate.

The space for each house should be not less than 25

feet frontage, and increased to any moderate width necessary



for a single house. The plan offered is laid out for a plot 28 feet in width.

This affords 25 for the house and 3 feet for the space at the side, which, as the next pair would be similarly arranged, would give an area of 6 feet between external walls.

The doorways would come better in the centre, as the staircase hall could be lighted by a dome, and the side lights from the area would be more valuably employed for the interior of the space between the front and back rooms.

In this plan the entrance passage is 5 feet in width, whilst to obtain greater space and importance for the portico and doorway, the corner of the room is cut off. This room is the library, and has the four corners at angles as shown. Each of them is, however, made use of, one containing a fire-proof safe, and the other a private cupboard. This room is 20 feet by 17.

The staircase hall is 9 feet by 20 and has light from the roof. The principal flight of stairs commences from this floor, thus cutting off all chance of odours or noise ascending from below, a back staircase being provided to the kitchen offices.

In the rear of the library is a gentleman's retiring-room and water-closet; next to it a serving-room, butler's pantry and store-rooms communicating with the dining-room, all these being lighted from the side area.

The dining-room is 23 feet by 20, with a circular end towards the rear yard, and upon the opposite side a recess is formed for the sideboard.

The drawing-room floor would permit of spacious arrangements for entertaining company, giving, in fact, two rooms back and front 23 by 20, and one between, with side windows and fireplace, nearly 14 feet by 20. If the habits of the family did not require the whole floor for reception-rooms, the back could be reserved for any other purpose;

otherwise, the three would naturally be opened one into the other.

The basement and chamber floors could be disposed to every possible advantage, with the facility thus obtainable for lighting at the side, and need no further remark.

### § 306. Advantages of above Plan.

The features of the plan could be preserved in houses of smaller size; in fact, the sanatory arguments in favour of dwellings thus built in pairs, as well as those of internal convenience, are very strong.

Much might be said of the exterior of our London houses, which are truly common-place enough, but the scope of this work does not permit other than remarks upon capabilities of plan and recommendations as to excellence of construction. It will, however, readily be seen that the chance of obtaining individuality and distinctive character in the component parts of a row of houses is greater by adopting the arrangement proposed of building them in pairs. Even then, however, the English peculiarity of each one doing as he likes, without regard to his neighbour, would have a dangerous tendency to permit one-half (for instance) to be repainted, whilst the other remained dingy, and so marring the breadth and unity of effect by the painter's plumb-line exactly in the middle between the two houses.

We must hope, however, when such are erected, that occupants will be found who will follow the golden rule as to love of their neighbour, at least to the extent of a mutually-bestowed coat of paint when needed.

### § 307. Sanatory Excellencies obtainable.

An advantage that can be at once appreciated offers itself in a scheme for houses thus built in pairs, in regard to the

drainage. The drain pipes would be laid underneath the side area, where they could be readily got at for cleansing and repair, whilst all house drains, soil and waste pipes, could be conducted into them outside of the building.

In erecting such houses, the upright pipe, for relief of the head of the drain from pent-up gases, and the discharge pipe from the soil pipes should by no means be lost sight of.

## CHAPTER IX.

### HOUSES IN SUBURBS AND COUNTRY.

#### § 312. Such Houses easier to deal with.

THE *house*, in suburb or country, presents fewer difficulties than one in a town; light and approach can be commanded on all sides, and therefore, whatever is required within so far as concerns them, for comfort or convenience, ought to be obtained.

#### § 313. Classed as Mansion, Villa, Cottage.

For the sake of simple classification, residences in the country may be considered as the *Villa*, the *Mansion*, and the *Cottage*. The first includes all such as are adapted to the wants and tastes of a family of moderate means, but who require somewhat of elegance in their home belongings; its scale is elastic, and may commence from as low as a rental value of £50 or £60, up to almost any limit short of that which would bring it under the denomination of a mansion.

#### § 314. What is a Mansion?

The *Mansion* is a building of such dignity and extent as to mark it as the family residence of a person of wealth and of assured social position. It should be placed in grounds of sufficient size, with enough of a park-like character to make it a country seat; or if near to a town, and standing

upon a smaller site, it should possess such a grandeur of outline and completeness of secondaries in the way of entrance gates, approaches, and the like, as to mark its importance. Mere size will not do this, although it is an important element in producing nobleness of effect when combined with simplicity of treatment and harmonious proportion. A large, widely-spread dwelling requires to be seen from a distance, and should, therefore, stand on an estate of corresponding magnitude ; near a town, on the other hand, too much extent of front is unsightly, and where placed upon a contracted area, giving little space around it, a large building looks out of place, unless lavishly decorated and attractive from its architectural beauty.

The size, therefore, of the mansion should be adapted to the extent of the estate and the grounds around it.

#### § 317. *The Cottage.*

The *Cottage* is of many kinds. When a purely country residence it approaches in many points of resemblance to the farmhouse ; whilst if occupied by those not engaged or interested in the cultivation of land it differs but little from the villa. No laws of architectural styles control the design of many examples of these buildings, and some whimsical varieties may be seen in all parts of England.

#### § 320. *The Villa : what it is.*

Correctly speaking, it would seem that no residence should strictly be called a villa, unless of Italian design or of a style congenial therewith ; but the word has been so completely adopted into our language, and has become so identified with a particular class of house, that there is no real impropriety (although undoubtedly an incongruity) in saying a Gothic or Elizabethan villa equally as



an Italian. The modern villa, moreover, has so departed from the ancient semi-classic type, as seen in the elegant private dwellings of the luxurious Romans among whom the villa had its origin, as scarcely to be longer entitled to retain the name, which common acceptance now assigns to the suburban or country residence of moderate extent, and of which the architectural expression is in conformity to certain defined rules.

A villa should not be of materials too rough, nor should it be too irregular in plan ; either of these qualities makes it more properly the *cottage orné*. It is associated with ideas of finish and refinement, even when arranged upon a small plan, and should have its immediate surroundings, as its grounds, gates, fences, and the like, of cultivated aspect and delicate finish. At the seaside, or in boldly undulating scenery, more marked expression may be given to the plan and to a picturesque employment of rougher materials with very happy effect ; but on tolerably level ground, by the side of a road and in a neighbourhood of many houses, the villa should be trim and carefully finished, and in conformity to some known architectural style.

### § 321. Villas in Suburbs of Paris.

Many of the French houses in the environs of Paris were (one dare hardly say *are*, now) very tasteful examples of what the villa could be made by graceful employment of well-chosen materials. The outline of the plan generally was less broken than in English architects' designs, and the projections were always less boldly marked ; but the summit outlines, the roofs, the breaks in height, and the skilful use of turrets, small domes, chimneys, and upper balconies, gave a very effective variety to the exterior, and helped very happily in enlivening the landscape.

**§ 322. Materials suited to a Villa.**

In the neighbourhood of London, villas are less commonly of stone than of brick, either plain, ornamented, or covered with stucco and cement. The introduction of terra cotta has been freely taken advantage of for the embellishment of their construction, and is far more to be recommended than cement. This material requires a tasteful selection as to colour in all other parts of the building, and that seems to be the principal artistic objection to most of the exteriors so embellished. Red brick requires a great deal of relief in the shape of projections and recesses to give it shadow and softness. Combined with terra cotta, in either a warm red or the light yellow brown which the material usually assumes, it is apt to have a harsh and obtrusive effect, which can only be softened down by natural shadows or by the overgrowth of luxuriant creepers. Verandahs, or other projections for shade, greatly conduce to this softening effect.

**§ 325. Semi-detached Villa.**

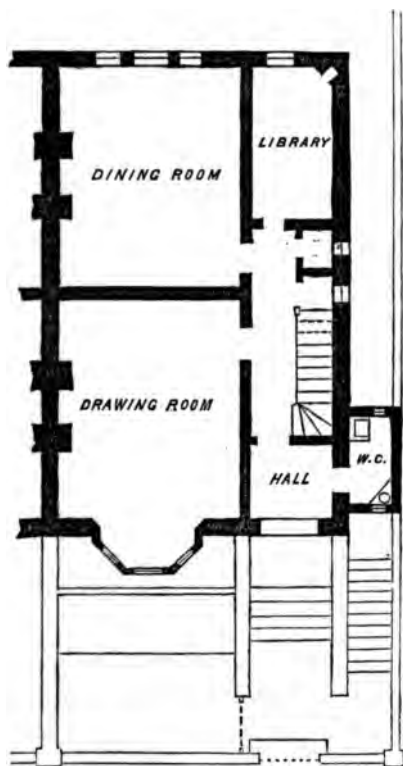
The villa of small size is often seen built in pairs,—semi-detached, as the phrase is. So arranged they have the advantages of light, and, consequently, ventilation, on three sides, and offer many conveniences to their occupants over those to be obtained by dwellings in a continuous row.

**§ 326. Cost of Pair of Villas.**

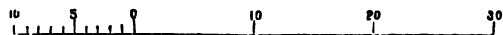
A plan of a very conveniently arranged residence built in pairs is given (see Illustration 10, page 156).

Each house occupies a plot of ground 28 feet frontage by 95 in depth. In front is a small paved yard 18 feet deep having a slope covered with ivy before the basement windows, and the necessary steps to the entrance door and

to the side door of the kitchen floor, sunk partially below. The house itself is 40 feet deep and 25 feet 6 inches in



*Ground Floor.*



No. 10.—Semi-detached Villa.

width, leaving a passage way of 7 feet between the next pair of houses, divided by a 9-inch party-wall, carried up

sufficiently high to prevent overlooking. The rear garden is about 37 feet in depth.

The arrangement of the ground floor only is given on the plans, as the remaining floors can readily be understood from the ground plan.

The entrance door is reached by five steps, and the descent at the side to the level of the passage way and the garden in the rear is by twelve, giving a height of 9 feet in the clear for the basement floor.

Within the entrance door is a vestibule, divided off from the staircase hall by a partition having an arched opening at the side, screening the stairs and making also more private the entrance to the gentlemen's retiring-room and water-closet, which is built out at the side, occupying the space of the passage way below, over which it is carried by an arch. This projection does not extend to the second floor, although, if required, it could be carried up any height the increase of internal arrangements made desirable; in so doing, however, it must be remembered that the free current of air between the two pairs of houses would be interfered with.

On the side of the staircase hall are the family rooms; in front, a drawing-room, 15 feet 6 inches by 18 feet 6 inches, with a bay window at the front end; in the rear a dining-room of similar size, and at the end of the hall a small library, 6 feet 9 inches by 13 feet. By the side of this is a store and china-closet, with an external window. The staircase to the basement is enclosed, and has a well-placed window at the head. The staircase is lighted on each level.

The basement contains the usual requisites; kitchen in front, under the vestibule a scullery with copper and sink, coal-cellar extending beyond the steps to the front door, with a knife and boot place between, lighted from the side. In rear of the kitchen is a small breakfast-room, looking on to the garden, and between this and the kitchen are store

closets. The wine bins are placed underneath the stairs, and there is also a private cellar under the external flight of side steps. The larder is under the library, and the servants' closet, which opens from the external passage, in preference to the entry within, is under the space occupied by the china-closet on the floor above. On the site upon which these houses are built the road is raised, so that the garden in the rear occupies the natural level of the land, the sewer and drains being several feet below the lowest level. The foundations are carried down several feet, so that there is a clear space under the basement floor of nearly 3 feet to the ground level. The external walls below the basement floor have numerous open gratings to secure circulation of air.

The bed-room accommodation is very good, comprising four rooms on each floor, two of equal size with the dining-room and drawing-room, one over the library, and in front a smaller room as a dressing-room with bath, opening out of the front chamber. There is a water-closet on the first floor over the china-closet, and upon the second floor a linen closet occupies the corresponding space.

The external finish is brick, with little embellishment beyond the cornice carrying the gutter supported upon brackets. The heads of the windows and door openings are segmented flat arches in gauged coloured bricks with moulded strings. The basement, as high as the first floor level, is laid in cement and faced with cement stucco.

The building cost was slightly under £1200, which, on reference to the tables in Chapter VII., sections 316, 317, 318, would give a fraction under sixpence per cubic foot, and £35, £25, and £18 per square respectively. The rentals obtained varied from £100 to £120, the ground rent being £22.

**§ 327. Cost on a Reduced Scale.**

In another vicinity houses arranged on precisely a similar plan but smaller in size, being but 21 feet frontal by 36 feet depth, cost £700 each, being at the rate of fivepence per foot cube, and about £32, £21 and £16 per square, for principal, chamber, and office floors. The rent of these latter is £60 and £65, and ground rent £13.

**§ 328. Larger Villas in Pairs.**

Where greater space can be given to a villa, which, when divided, affords liberal garden ground to each one of a pair, and yet would be insufficient for a separate erection, it is well to place two with the divisional wall in common. A plan is shown (Illustration 11, page 160) of a conveniently arranged half of such a pair of villas, which has many commendable features.

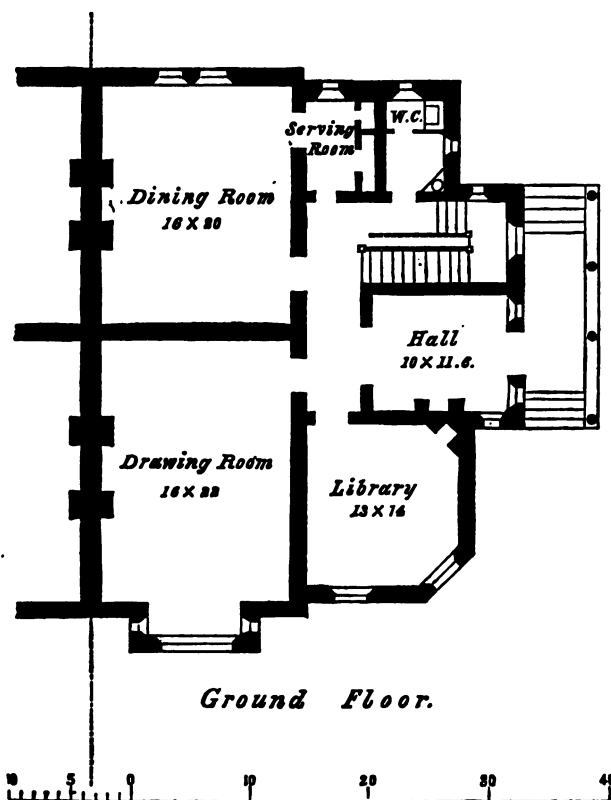
The frontage for each plot should not be less than 60 feet, and, if a stable was required in the rear, 65 to 70.

The entrance is at the side, under an open portico, or rather light verandah; from this the principal door opens into a hall, 11 feet 6 inches by 10 feet, with a fireplace, and at the end double glazed doors give access to the corridor from which the family rooms and staircase are gained.

The accommodation for the family consists of a library 13 feet by 14 feet, with its two corners truncated, one containing a window, and the other the fireplace. The reason of thus cutting off the external corner was to obtain better approach to the entrance; the effect, however, externally, is pleasing, and the room receives a cheerful and appropriate light from the disposition of the windows. The drawing-room is in front, and is 16 feet by 22 feet, with a bay window extending from the end. The dining-room is 16 feet by 20 feet. Connected with this is a serving-room with similar room

below, communicating with the kitchen ; between the two floors is a lift.

Leading from the staircase, which is well placed for



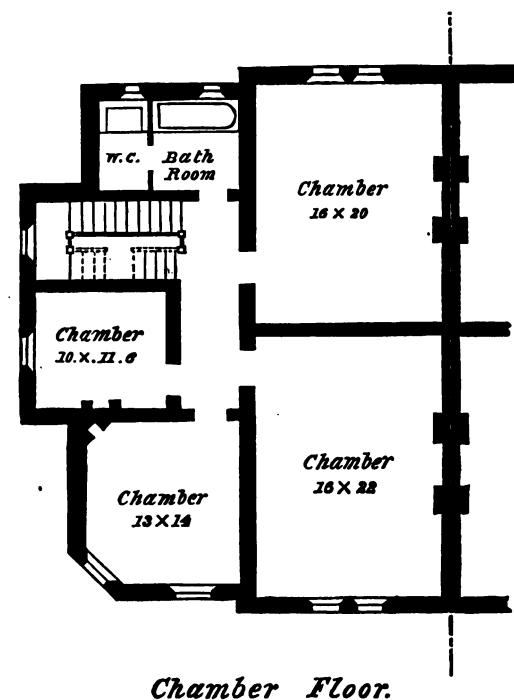
No. 11.—Semi-detached Villa on larger plot of Ground.

privacy, and is abundantly lighted by windows in its external walls, is a dressing-room and w.c.

The floor below contains the usual domestic offices, requiring nothing but the carrying down of the walls of

the principal floor to afford a good arrangement of all the necessary conveniences.

The plan of the bed-room floor is shown in Illustra-



No. 12.—Semi-detached Villa on larger plot of Ground.

tion (No. 12, page 161), and represents what would be the other half of the pair of houses. There are four chambers, two of them of large size, a bath-room and inner w.c. upon the first floor; and above this are two family rooms over the large chambers, and two for servants over the others; a box-



room, linen-closet and cistern occupying the space over the bath-room.

The size of the bed-rooms would permit construction of wardrobes and store-closets between the ends of the two large ones, but the family for whom these plans were prepared, preferred moveable furniture instead.

The cost of the pair, including outer fences, garden, and internal fittings of excellent quality, is £3,600, and, with plainer internal finish, could be reduced. The scale of cost agreeably to the tables previously given, is seven pence per cubic foot, and £37, £26, and £20 per square.

### § 330. Plan of Detached Villa.

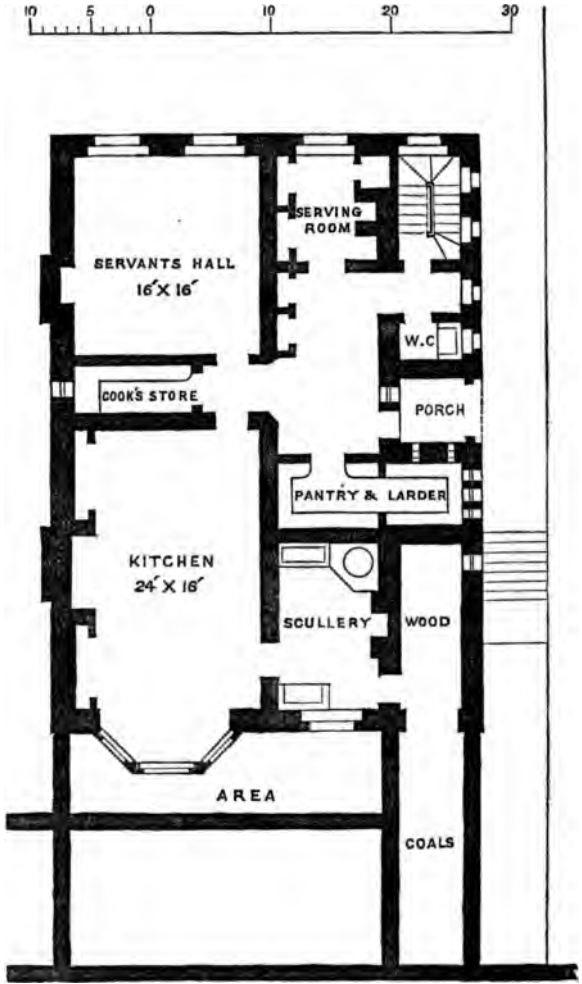
A form of villa frequently required is one which, although detached, is obliged to be so near to its neighbours upon either side as to make side lights undesirable, excepting where necessary, for secondary portions of the house.

As this is a very common want, an example of a plan of such a house is offered, to which particular attention is requested (page 163, plans 13, 14).

The plot upon which it is intended to stand is 45 feet frontage, with a comparatively considerable depth in rear. It faces a leading suburban thoroughfare, and the building line is about 20 feet from the front fence wall.

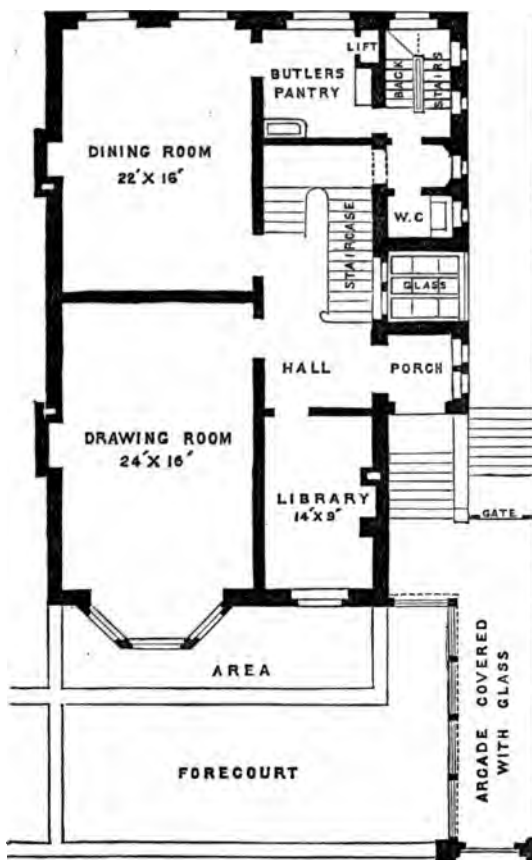
The plan of the ground floor shows the general arrangement. The outside boundary wall is carried sufficiently high to give the requisite seclusion, and at the same time not to cause obstruction to the view from the windows of the front rooms. The entrance is through a close gate or doorway at one end of the outer wall, within which an enclosed arcade is provided, and which extends to the door of the entrance porch. The same external doorway serves for visitors and servants, a gate separating the two flights of steps, one conducting down to the offices and the other ascending to the porch.

The porch is enclosed, and has wide windows towards

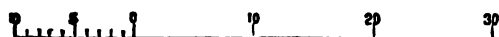


PLAN OF BASEMENT FLOOR.  
No. 13.—Detached Villa.

the side. The entrance hall contains the principal stair-



PLAN OF GROUND FLOOR.



No. 14.—Detached Villa.

case, which commences upon this floor, and has a window over the glass roof of the porch leading to the lower offices.

In front is a library, 14 feet by 9 feet, a drawing-room, 24 feet by 16 feet, with a half octagon projecting bay at the front end. In the rear is the drawing-room, 22 feet by 16 feet, with two end windows. Attached to this is a butler's pantry, with sink and shelves for china and glass, and also a lift communicating with a room below.

A back staircase, which is carried to the upper floor, is conveniently placed in the rear external corner of the plan, and is approached by a vestibule with external window and a door in the archway leading to main hall. From this vestibule access is obtained to the water-closet. The privacy of the entrance to the domestic offices, with the convenient arrangements of access to the butler's pantry and dining-room without passing at all into the main hall, make this plan a desirable model for dwellings of such a size and situation.

The plan of the basement floor (No. 13) shows that every feature of domestic arrangement can be secured. The entrance is at the side, and is under a glass-covered porch. The inner vestibule is lighted by a window at the side of the door, also by a window in the vestibule at the end, which leads to the servants' stairs.

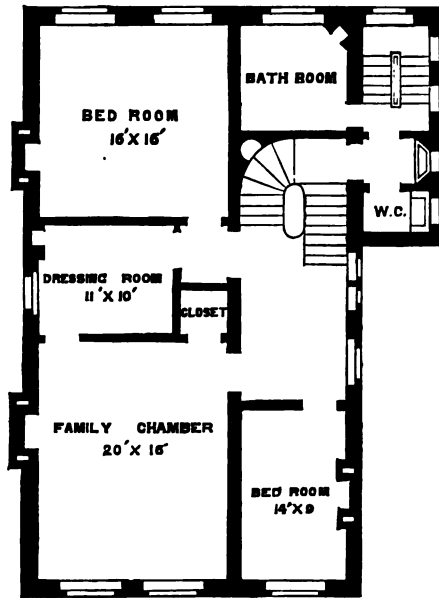
The kitchen is in front, and is of the same dimensions as the drawing-room above, and has connected with it a scullery with sink, also a boiler and wash-tray. Out of this is the cellar for fuel, and a knife and boot-room.

The pantry and larder are connected: an arrangement made peculiarly suitable by the position naturally assigned to them upon the plan.

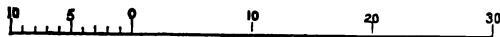
A cook's store-room with external window is between the kitchen and the servants' hall.

The serving-room, which would contain cupboards for

china and glass, is under the butler's pantry, whilst a water closet for the servants occupies the same position as on the floor above.



PLAN OF FIRST FLOOR



No. 15.—Detached Villa.

The wine cellar is under the rear of the house, the back staircase being carried down thereto; or if such further accommodation was not needed, the convenient iron bins now so universally used, would find ample wall space in the lower hall; or the cook's store-room could be retained for





VILLA RESIDENCE,

No. 17. See page 167.

wine, the pantry sufficing for the former, with enclosed presses and cupboards around the servants' hall.

The privacy of the kitchen and the small number of doors connected with it are noteworthy.

The plan of the first floor shows two large bed-rooms, one smaller, and a dressing-room. The bath-room, water-closet and housemaid's sink are entered from the platform at the turn of the principal staircase, and are also on the level of the landing of the back staircase.

The same number of rooms is provided upon the floor above, making in all four principal, four secondary sleeping rooms, and a man's room over the bath-room at the intermediate level, with a box-room of the same size on the upper floor.

This house is supposed to stand a few feet from the external boundary wall upon one side, reserving the greater space upon that towards the entrance for garden, &c., or for road to the stables, which, if required, would be arranged at the extreme end of the rear.

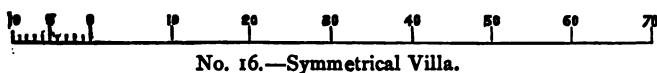
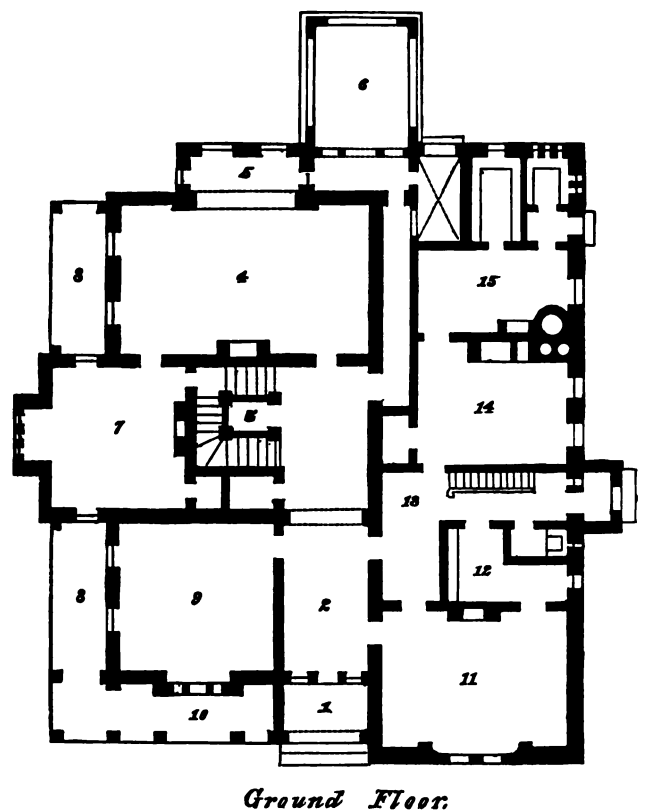
The cost in the immediate neighbourhood of London, by the several scales that have been given, would be from £2350 to £2600 ; and in some places in the country, where brickwork could be contracted for at £10 10s. per rod, the building could be brought to £2000 to £2250.

### § 331. Plan of Symmetrical Villa.

A symmetrical villa suited to well-arranged grounds in the suburbs of a country town, and adapted equally for the residence of a professional man or of a private gentleman, is given as an example of a regular plan, almost a square in its outlines, and yet possessing great variety in elevation. Its domestic accommodation has been found to be convenient, and the arrangement of the family rooms is such as to permit of elegance of living without involving a large establishment.



The plan of principal floor shows an entrance-porch, 1, an inner hall, 2, with staircase hall, 3. In the rear is the



drawing-room, 4, which is 27 feet by 17 feet, with a large bay-window, 5, the side sash of which opens into a conservatory, 6.

No. 7 is the library, 16 feet square, forming the lower storey of a campanile or tower. In this room is provided a large fire-proof closet, seen upon the plan. No. 8, is a verandah, which is continued across the end of the drawing-room and finishes in front as a terrace, 10, with balustrades.

No. 9 is a morning room, 17 feet square, with a projecting window in the front wall.

Upon the opposite side of the entrance-hall is the dining-room, 11, 18 feet by 23 feet, communicating with which is the serving-room, and butler's pantry, 12. Beside this is the servants' staircase, 13, in which is a water-closet. The kitchen, 14, and scullery, 15, with store-rooms, closets, and the like, occupy the rest of the floor. There is a corridor, leading to the garden vestibule, and to the conservatory, No. 6.

The chambers are disposed upon a single floor above, with a second storey again over the rooms above the dining-room and scullery inclusive, and the tower is carried a full storey above the roof, the staircase-hall also being carried up sufficiently high to give entrance thereto. There are in all 6 principal sleeping-rooms, with closets, bath-room, and the like, with 3 large rooms on the upper floor, and one on the top floor of the tower. In this example, the drawing-room was not continued above the first floor, but if so desired, there would be an additional sleeping apartment and dressing-room attached.

This villa was erected of brick, with cut stone dressings; the verandah being of wood with metal roof. Its external character may be seen from the sketch (Plate 17), and as an exponent of Italian architecture in simplicity and honest expression, it is offered as an average illustration of that style.

The cost, including all internal necessities, a cellar under the whole, and the erection of the conservatory

and hot-water apparatus (which also was available to warm the hall and passages), was under £3000. It was well and substantially built, and has called for no expensive repairs or anything but the ordinary outlay for maintenance.

### § 332. Arrangements in Houses of Professional Men.

The suburban houses thus far sketched are such as would be suited to general occupancy; occasionally special arrangements are rendered desirable, as for instance in the dwellings of the professional man, the literary student, or the clergyman. These may be classified under the common title of the "parsonage" house as in *plan*, the building suited to the habits and professional requirements of the clergyman, would suit either of the former.

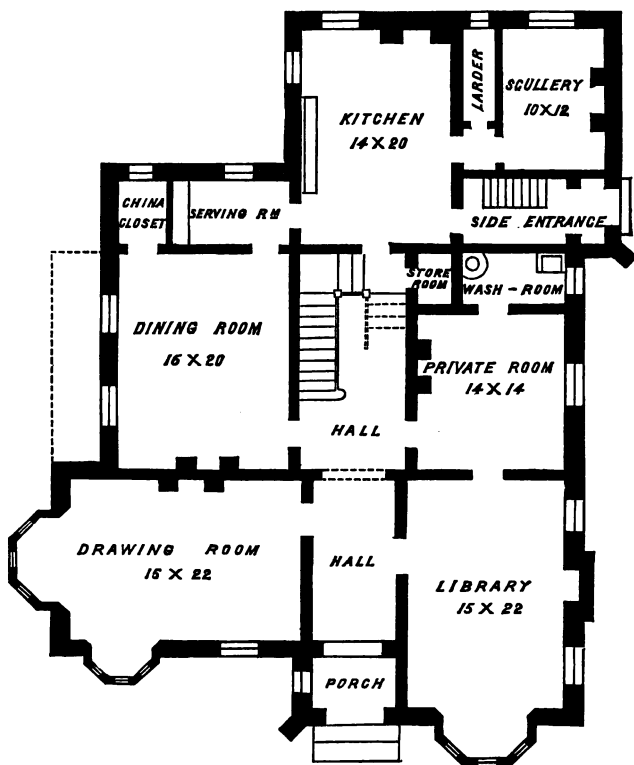
### § 336. The Suburban Parsonage.

The *suburban parsonage* differs only from the country residence of the parish minister in its greater condensation and compactness; it is not often seen with any characteristic treatment in the neighbourhood of London, although it may have such features as pointed gables and other pseudo-gothic trimmings given to it, to impart an ecclesiastical look, and make it correspond with the neighbouring church. It is, however, with the plan only that we have to do.

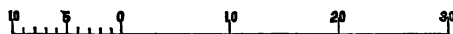
An example of such a house is offered (Plan No. 18, page 171), of which the ground-floor arrangements are shown, the accommodation on the chamber storeys naturally suggesting itself. The entrance-porch is in front, and the house occupies a frontage of about 50 feet.

The entrance-hall is 8 feet in width, increased to 10 feet for the staircase. On the right is the library, 16 feet by 22 feet, with a bay window in front, and side windows

on either side of the fireplace, which in this case is placed in the external wall and projects outwardly. In the rear of



*Ground Floor.*



No. 18.—Suburban Parsonage.

the library is the private room or study, and attached to it is a dressing-room, with water-closet and wash-basin.

The family rooms consist of drawing-room, 15 by 22 in front, with two bay windows, one at the end, and the other forming a pleasant break in the long side of the front. In the rear is the dining-room, 16 by 20, and opening from it are a china-closet, and a serving-room or pantry directly communicating with the kitchen.

The staircase-hall is lighted from above, and is of liberal dimensions. It contains a store-room.

The domestic offices comprise a kitchen, 14 feet by 20 feet, larder, scullery, 10 feet by 12 feet, and a side entrance with secondary staircase.

The accommodation on the upper floor would consist of four principal sleeping-rooms, one single room over the entrance-hall, a dressing and bath room with water-closet, and two secondary or servants' rooms. If a second floor of sleeping-rooms were added, the provision would be doubled.

The cost would vary from £1870 to £2200, if with a single floor of chambers; to £2300 to £2700, if with two.

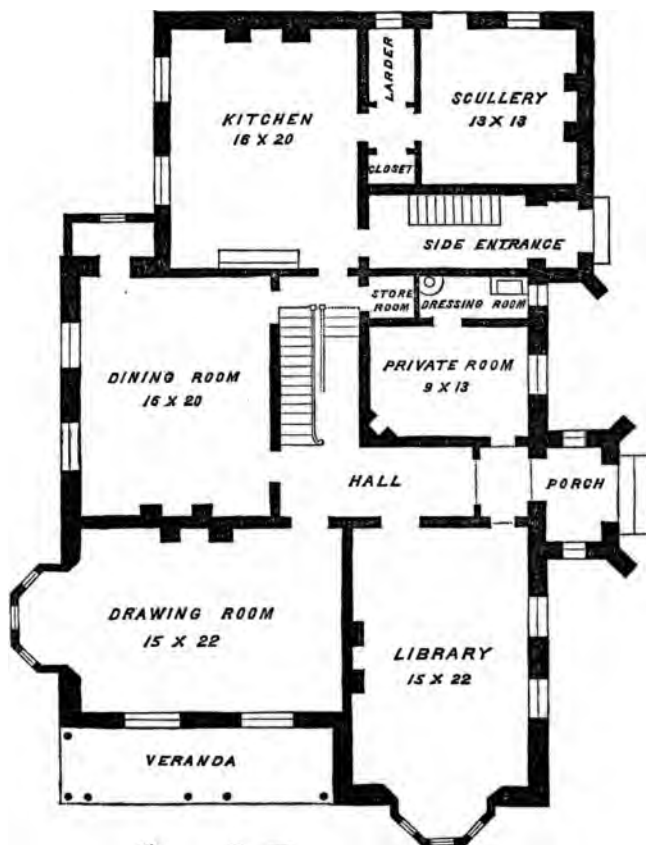
### § 337. Plan for Parsonage, with Side Entrance.

The ground floor of a somewhat similar plan, capable of being built for rather less money, and occupying less of frontage, is offered (Plan 19, page 173). In this the entrance is at the side, and the staircase-hall is not made so important a feature.

Leading from the porch is an enclosed vestibule, out of which are doors opening into the library in front, and into the private room, thus bringing the two into communication, and giving an advantage in not requiring callers upon the parson to go beyond the vestibule.

The family rooms and domestic offices are about on the same scale as in the former plan, excepting that the

nearness of the kitchen to the dining-room renders a serving-room unnecessary. The ladies' private store-room or china-closet is built out externally, and fits conveniently



*Ground Floor.*



No. 19.—Parsonage with side entrance.

into the corner afforded by the projection of the kitchen wall.

In front of the drawing-room is a verandah. This plan gives somewhat more of seclusion to the apartments occupied by the family, but, on the other hand, the side entrance involves the separation of the private room from the library, an arrangement, however, which finds favour with many clerical householders whose opinion has been sought upon the respective plans.

The amount of bed-room accommodation in each example would be about the same. The cost of erection would be from £1700 to £2000.

#### § 340. Attributes of Country Parsonage.

The *country parsonage* should not be too large or pretentious. The cost of repair and maintenance sometimes falls heavily on a family, especially when bereft by death of the means of official support, and a large claim for dilapidations is made by the successor. It is sometimes a cruel thing for an incumbent with large private means to indulge his own elegant taste, and leave to his successors a residence far beyond the income of the living; not but that a good house is always a welcome boon as a part of clerical preferment, yet there may be "too much of a good thing," and crippled means, and then a neglected, dilapidated building, are the results. The house above all things should be substantially built, the walls solid and of good materials, the roofs well timbered and stoutly framed, and the covering as durably laid as can be. All of these are matters of greater importance than correct architectural expression, if professional aid is not called in; but perhaps no building ever erected requires more completely the skill and direction of an architect than the country residence of the clergy.

**§ 341. Care necessary in its Plan, &c.**

The building requires, in plan, the greatest care ; it must be convenient ; it must be capable of accommodating a large family, often an unexpected number of occasional guests, and yet it must be compact, so as to make domestic labour easy, and to require as little expense as may be in warming and carpeting. In construction, nothing but what is strong, simple, and lasting must be allowed, and such ornamental portions as are attainable must be in real material, not stucco or sham. In fact, the parsonage as a building should be as durably and as honestly constructed as the church, and its maintenance should be regarded alike as a sacred duty by those permitted for a time to enjoy its possession.

All its fittings should be chosen with great care. The plumbing and other appliances should be as simple as possible in their arrangements, and placed so as to be free from danger of frost, strongly made, and well supported, so that repairs may be infrequent ; for, in the country, skilled labour in such departments is rarely available, and the expense attending poor work is a serious item.

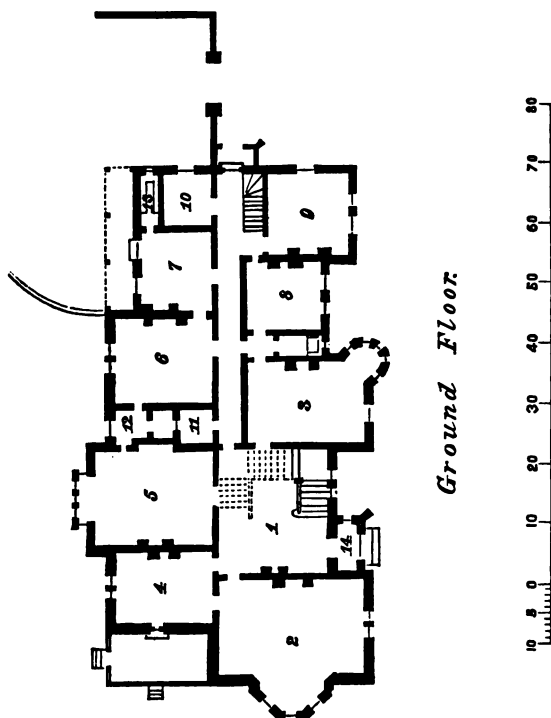
The appearance of the Parsonage should be inviting and cheerful, its situation easily accessible, and its internal arrangements permissive of a wise and frugal hospitality.

The homely guests should be thought of, as well as those of the parlour, so a second kitchen or roomy servants' hall (even in a small establishment) will always be a welcome addition to the plan. This should be so disposed as to be readily accessible from the parson's private room, as it will then form a convenient waiting-room when many of his humbler parishioners seek to see him ; and it should also be close to the office entrance, so that the necessary domestic duties of the servants need not be interfered with by such visitors.



## § 343. Plan of Country Parsonage.

A plan of such a house—which would also serve as that of an ordinary country house of moderate pretensions—is here delineated.



No. 20.—Country Parsonage.

It occupies a somewhat extensive frontage, and is so arranged as to give a variety to the external features, both as to projection and height, as would suffice to make an agree-

able building, without the necessity of ornament. It is adapted to any material, and to the peculiarly English development of later Gothic, which common sense uses as the most convenient and economical style for an unpretending country building, especially when of an ecclesiastical character.

The divisions of the plan are numbered, and are as follows:—

No. 1 is a large square hall, in which is the principal staircase; this apartment is 21 by 18, and has an open fireplace, so that, communicating as it does with the four principal rooms, and being shut off from the corridor leading to the offices, it could be used for social enlargement of the interior. No. 2 is the drawing-room, 16 by 24, with a large bay window in the longer side. No. 4 is the morning or private sitting-room, 14 by 17, having a small conservatory and glass door thereto on one side. No. 5 is the dining-room, 16 by 21, with a rectangular bay and narrow side lights at one end. Connected with this is a serving-room (12), containing enclosed glass and china closets, and opening into the kitchen, No. 6. No. 11 is a large store-closet, with glass panel for light.

No. 3 is the library, 15 by 20, having from the external corner an octagonal projection, forming a reading recess, and being the lower story of a turret carried up beyond the roof, and terminating in a spire, with a dove-house above the roof, and a vane on the summit. No. 14 is the entrance porch.

Separated by a small entry (which leads to a gentleman's water-closet) is the study, or business-room of the parson (or private country gentleman). No. 8, an apartment, 14 feet by 12; and near to this, and also to the staircase-hall and porch of the offices, is the servants' hall, No. 9.

Upon the other side of the corridor is the back kitchen or scullery, No. 7, with its outside door opening under a covered gallery leading to the kitchen yard; leading from

this the larder, 13. Upon this floor is a sleeping-room for a man-servant, No. 10, for protection and convenience.

The knife-house, coal-sheds, dairy, and other domestic adjuncts are disposed in the yard, the screening wall of which is curved in the direction indicated by the plan. Below 8 and 9, the walls would be carried down sufficiently deep to form cellars for wine and beer, or, if the soil made such an arrangement beneficial, for the reception of cold larder and milk-room.

The sleeping accommodation would consist of five principal rooms in the main portion of the building, and four in the wing, with two dressing-rooms, a bath-room, and two water-closets. Attic rooms could easily be contrived in the roof, or the wing could be so divided, as to the height of its several storeys, as to give a second floor of sleeping-rooms over.

The cost would vary from £2700 to £3500, according to the internal finish and the nature of the materials. It could be well, substantially built, and attain a picturesque exterior, for a sum between these limits, including every requisite fitting; or in cases where the external walling could be put up for very moderate price, the lower sum named would suffice.

#### § 344. Suggestions how to reduce Cost.

Should the general features of this plan meet a particular want, but the estimated cost appear too high, a reduction could be made by omitting the drawing-room, No. 2, and letting No. 4 be extended to the end wall of the dining-room and become the drawing-room. The staircase hall would then be reduced in width, would occupy a corner, and the library and its adjuncts be brought further towards the external wall, so that the outside wall of the library came into a line with the wall between the kitchen and serving-room and store-closet, 12 and 11. The other rooms could also be reduced in size, although the leading arrange-

ments might be retained, and by such means a diminution of cost would result. Or, the scale of every room, and consequently of the whole building, might be reduced, and the expense of building brought lower accordingly. In attempting to reduce the estimate of a building under discussion, when not any one of the rooms is willingly allowed to be dispensed with, or any important features can be given up, it is often a useful help to find what common multiple prevails in the dimensions, and then to reduce it to one lower, in some definite proportion towards the sum that it is wished to bring the estimates approximately near. As an example, suppose that the cost is sought to be reduced one-eighth, and that 4 is found to be a frequent multiple, then 3 feet 6 inches would in each case take the place of 4 and be multiplied by its proper proportions accordingly.

#### § 345. *Difficulty in following arbitrary Rules.*

Thus, in the plan of this parsonage, the dimensions, for instance, of many of the room are exact multiples of 4, or bear easily reducible proportions thereto, and can be reduced as follows:—the drawing is 16 by 24, that is, 4 times and 6 times 4; then taking 3 feet 6 inches instead of 4, the result will be that the size of the room would be 14 by 21, and so with all the rest. This, although frequently of great service, is not an absolute rule; because, on the one hand, heights cannot well be reduced in the same manner, nor does the cost exactly follow the same scale of reduction. Some architects plan upon the principle of a fixed multiple, and let every dimension follow the same laws of proportion; but in practice such frequent deviations are necessary, and the self-imposed restraint has to be so constantly wandered from, that there is rarely any certainty of principle obtainable by such attempts. Each room may be so treated, and often

with happy results, as to proportion and symmetry; but then regularity of outline is indispensable, or the working of the rule falls to the ground. Of course, too, the rooms must all be of *one size*, to be (justly) of *one height*—an arrangement scarcely possible, and certainly not desirable.

**§ 350. Small Country House differs little from Villa in Plan.**

The *small country house* differs so little from the villa as to make a separate description difficult. It is less under architectural control as to style, and permits of the very simplest construction and finish. An example of one upon an inexpensive scale forms the subject of the estimate in the seventh chapter, sections 339 to 341, the plans of which are now offered (*see* Illustration 21, page 181).

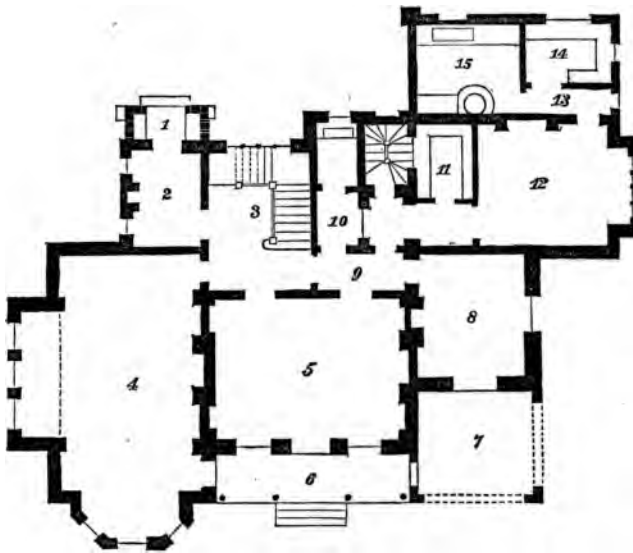
**§ 351. Example of Plan of Country House.**

The house is built of brick, has gables with timber barge-boards, and in its details is of the late English Gothic or Elizabethan type, with but little ornament. It is, in fact, a common-sense development of structural necessity, with ordinary materials honestly employed. The plan of the principal floor provides an external porch, No. 1, and an entrance hall, No. 2, which is 7 feet 9 inches by 10 feet 9 inches, containing a fireplace and two windows; from the side of this a swing door leads into the inner hall, No. 3, the dimensions of which are 11 feet 6 inches by 16 feet, and which contains the principal staircase.

The family rooms are a drawing-room, No. 4, with a square bay window at the side and a semi-octagonal bay at the end. This room is 16 feet wide and 27 feet long, including the projection of the bay. The side bay is 15 feet by 4 feet. The dining-room, No. 5, is 22 feet 9 inches by 16 feet, and has three windows, the central of which opens on to a verandah, No. 6, at the end of which is a conservatory,

No. 7. The morning-room or study, No. 8, has a window also opening into the conservatory, and is 14 feet by 12 feet.

An inner corridor, No. 9, leads to the entry to the



*Ground Floor*



No. 21.—Country House.

- |                                        |                        |                    |
|----------------------------------------|------------------------|--------------------|
| 1. Porch.                              | 6. Verandah.           | 11. Pantry.        |
| 2. Entrance Hall.                      | 7. Conservatory.       | 12. Kitchen.       |
| 3. Inner Hall and Principal Staircase. | 8. Study.              | 13. Kitchen Entry. |
| 4. Drawing Room.                       | 9. Corridor.           | 14. Larder.        |
| 5. Dining Room.                        | 10. Lavatory and W. C. | 15. Scullery.      |

kitchen, as also to the back and cellar stairways. From this corridor are a lavatory, No. 10, with an inner water-closet. By the side of the kitchen is a pantry, No. 11, which is lighted by a sash towards the back stairway. The kitchen, No. 12, is 14 feet by 16 feet 8 inches, with the projecting bay window at one end. In rear of this is the kitchen

entry, No. 13, the larder, No. 14, and the scullery with sink and copper, No. 15.

The bed-room floor follows the same division as that of the rooms below, excepting that the space over the drawing-room is divided into a sleeping-chamber and dressing-room, and that over the dining-room into two. There are therefore four principal bed-rooms, one single room, two servants' rooms, a bath-room, and a housemaid's closet and water-closet, besides a large linen-press over the kitchen entry.

A sketch of the exterior from the garden is given in order to show the style of finish, and to assist in forming an estimate of cost when applied to buildings of similar extent and character. The design is by Mr. J. S. Quilter, architect, and is a satisfactory example of a well-considered plan, carried out in a pleasant, unpretending manner.

### § 352. **An American Country House.**

An example of an American country residence, executed by the architect whose plans of town houses have already been given (Mr. Charles Duggin, of Broadway, New York), is offered; and as its external character is very fairly an exponent of a frequent style of rural architecture in the suburbs of large American towns, a sketch of the entrance front is appended to the plan of the principal floor (*see* Illustration 23, page 183).

In front is a carriage porch, No. 1, from which a flight of steps, divided in rather a peculiar manner, leads to the entrance porch, No. 2, which shelters the principal doors. These open into a vestibule, No. 3, with closets for hats and cloaks on either side. The hall, No. 4, is 14 feet wide, and opens at right angles to the staircase hall, No. 5, which is 10 feet in length, and is mainly lighted from above.

On the left of the hall is the library, No. 6, which is 17 feet by 24 feet; adjoining it the drawing-room, No. 7,



No. 24. See page 182.

VIEW OF AMERICAN COUNTRY HOUSE.



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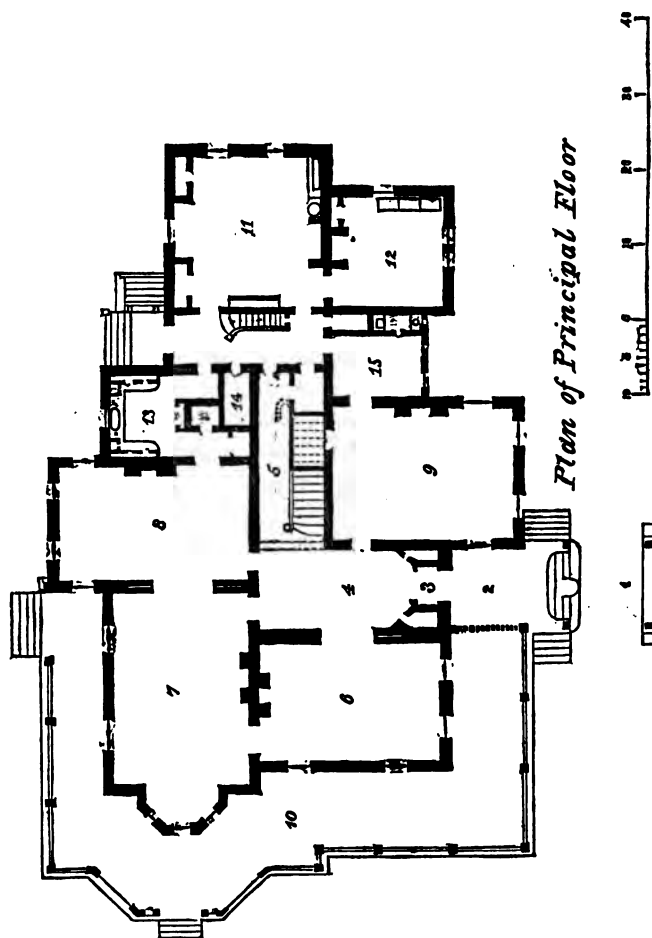
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No. 23.—American Country House.

- |                      |                   |                       |
|----------------------|-------------------|-----------------------|
| 1. Carriage Porch.   | 6. Library.       | 11. Kitchen.          |
| 2. Entrance.         | 7. Drawing Room.  | 12. Scullery.         |
| 3. Vestibule.        | 8. Dining Room.   | 13. Butler's Pantry.  |
| 4. Hall.             | 9. Billiard Room. | 14. Store-room.       |
| 5. Principal Stairs. | 10. Verandah.     | 15. Gentleman's Room. |

18 feet by 25 feet 6 inches, with a bay window 10 feet in width and projecting 5 feet. The dining-room, No. 8, is 16 feet by 25 feet. From the projecting end of this room, a wide verandah, No. 10, is carried round the external wall of the drawing-room and library as far as the entrance porch. This is always a prevalent feature of an American country house, and adds much to its beauty and convenience.

The domestic offices comprise a kitchen, No. 11, 20 feet square, with a laundry and scullery, 15 feet square, No. 12. Attached to the dining-room is a well-arranged butler's pantry, No. 13, containing sink and presses for glass and china, and in the entry to the dining-room is a store-closet for preserves and a small receptacle for wines.

The rear passage has a porch over the external door, and contains the servants' staircase, and also a long store-room, No. 14.

In the principal hall is a hall-closet under the landing of the stairs, a closet from the billiard-room, No. 9, being also formed under the stairway itself. Attached to the billiard-room is a private office, or gentleman's room, No. 15, out of which is a dressing-room with washstand and water-closet, in the rear of which is a closet for hoops, croquet sets, and the like.

The bed-room accommodation affords five principal chambers of large size, with dressing-rooms, bath-room, water-closets, housemaid's closet and linen-room, a nursery, nurses' bed-room, store-room, and two secondary bed-rooms upon the main floor, whilst the peculiar construction of the roof provides four large and one small sleeping-room, and a box-room, and space for tank for water service.

There is a cellar under the entire house, and therein is the warming apparatus, spacious drying-rooms for indoor washing, cellars for fuel, wine-cellar, milk-room, and ice-house.

The exterior of the house is sheathed with tongued and grooved narrow boards placed diagonally, and upon these is spread heavy felt paper, and the whole is then covered with narrow "clap-boards" rabbeted. The frame of the building is filled in with hard mortar between the studs. These wooden houses are in common use in the United States, and are weather proof, warm in winter, cool in summer, and are exceedingly durable, far more so than would be supposed. The excessive dryness of the atmosphere undoubtedly has much to do with this, and the abundance of timber, and the readiness with which it is worked (for every genuine American is a born carpenter), will for a long time cause timber houses to be erected in the country.

Not, however, that there would seem any economy in so doing; for the house under notice is finished in the most costly and elegant manner both within and without, whilst the expense of the whole is stated to have been, in the letter of the architect, "about 45,000 dollars;" which reduced to English money would now be somewhere between £8,000 and £9,000—a large sum for a residence of such a size. By the square, according to the tables herein given, the average cost would seem to have been about £175 for the principal rooms, £120 for the secondary, and £95 for the offices.

The description of the interior, however, states that all the rooms are panelled, or otherwise finished, in hard natural woods, carefully polished, and elaborately moulded; rare woods, as walnut, Hungarian oak, ebony, and the like, being introduced, whilst such features as carved and inlaid wooden mantels, with panelling to the ceiling, and ornamental clock in the centre, large pier glasses in the hall, fitted book-cases in the library, seem to have been freely supplied; and no doubt a very large proportion of the cost is due to the completeness and handsomeness of the internal fixtures.

**§ 353. Sliding Doors between Rooms.**

It will be noticed that the usual American arrangement of preferring widely opening sliding doors between the rooms obtains; but there is no reason that the plan should not be adapted to the English notions of privacy by making the internal partitions without these apertures.

The situation is described to be charming, the house standing on the range of hills that forms the eastern boundary of the Orange Valley, in the state of New Jersey, a moderate distance from New York.

**§ 354. Picture Gallery for Country House.**

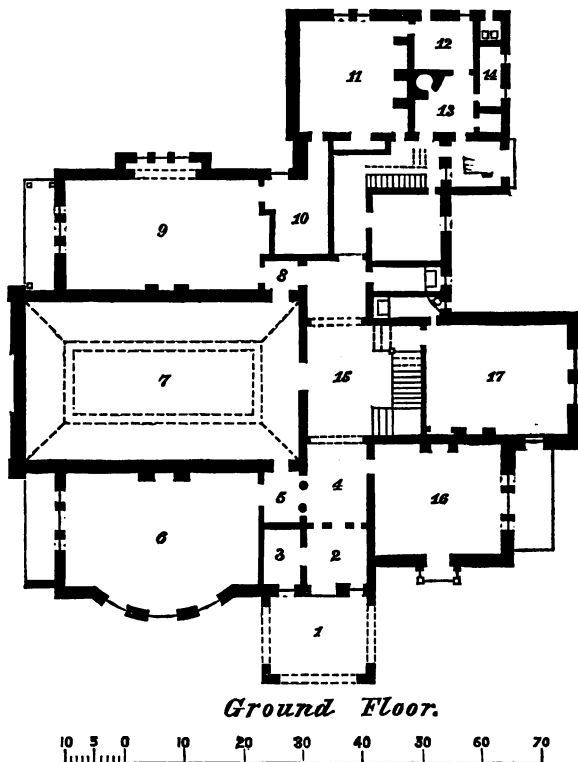
On looking over some plans of other American country residences, erected a few years ago from designs by the author, one presents itself as offering a suggestive arrangement for a somewhat peculiar and yet by no means infrequent want, which is of a house, otherwise of moderate size, and especially of moderate cost, but containing within it a large room as a picture-gallery; this moreover to be, not in a wing and thus but of occasional use, but so connected with the family rooms as to belong to them and to be fully enjoyed accordingly.

**§ 355. Plan of Country House with Picture Gallery.**

The ground-floor plan (Plate 25, page 187) is alone given, and is thus arranged:—

No. 1 is the carriage porch; No. 2, the entrance vestibule, with cloak-room, 3. No. 4 is the inner hall, from which a lobby, 5, leads to the drawing-room, 6, a large room with verandah at the end. No. 7 is the picture-gallery, extending the height of two storeys, and lighted with a coved glass roof. The dimensions of this are 46 feet length, 26 feet width, and a height of 24 feet to the

cove of roof. From the lobby, 8, is the dining-room, 9, with its convenient serving-room and passage, 10, leading to kitchen, 11, and its customary offices, sink-room, 12, scullery, 13, larder, 14, and store-closets.



No. 25.—Country House, with Picture Gallery.

- |                    |                     |                       |
|--------------------|---------------------|-----------------------|
| 1. Carriage Porch. | 7. Picture Gallery. | 14. Larder.           |
| 2. Entrance.       | 9. Dining Room.     | 15. Central Hall.     |
| 3. Cloak Room.     | 10. Serving Room.   | 16. Library.          |
| 4. Hall.           | 11. Kitchen.        | 17. Billiard Room.    |
| 5. 8. Lobbies.     | 12. Scullery.       | 18. Gentleman's Room. |
| 6. Drawing Room.   | 13. Sink Room.      | 19. Servants' Porch.  |

The central hall, 15, is carried up as a low tower above the roof, with an inside gallery for the enjoyment of extensive views which the situation commands.

The rest of the plan is occupied by the library, 16, with a verandah at one end, by the billiard-room, 17, with lavatory and water-closet attached, and by a gentleman's business-room, 18. There is also a second water-closet between this and the lavatory. The side entrance is under a porch, 19, and beyond is the back entry and staircase. It should be noted that beneath the whole is a lofty, dry, and well lighted cellar, and, the ground falling off rapidly towards the rear, there are further domestic apartments below the kitchen wing.

The bedroom accommodation can be readily imagined from the disposition of the lower floor; and in addition to the upper storey there are lofty and airy rooms in the roof, giving in all a very extensive range of sleeping-chambers, dressing-rooms, and toilet appurtenances. This house was built of wood filled in solidly between the studs, and was erected on a beautiful site on the slope of the Berkshire hills, Massachusetts, U. S., at a cost of between £4,000 and £4,500.

The plan is slightly altered from an illustration which appeared in a previous work by the author ("Homes for the People"), the change being in the arrangement of the entrance vestibule, in the shape of the front line of the drawing-room, and in the making the picture-gallery open into lobbies in connection with the dining and drawing rooms, instead of having direct communication therewith, as in the original plan. The value of this change is obvious, as all the advantages of the social use of the picture-gallery are retained, whilst greater seclusion is secured.

### § 360. Irregular Plan amid wild Scenery.

In grounds of considerable extent, and in romantic

scenery abounding with wild and strongly marked features, an irregular plan is appropriate. The variety afforded by different heights finds a fair exponent in the example which appears as the vignette on the title-page of the present volume.

**§ 361. Large Stone House with Tower.**

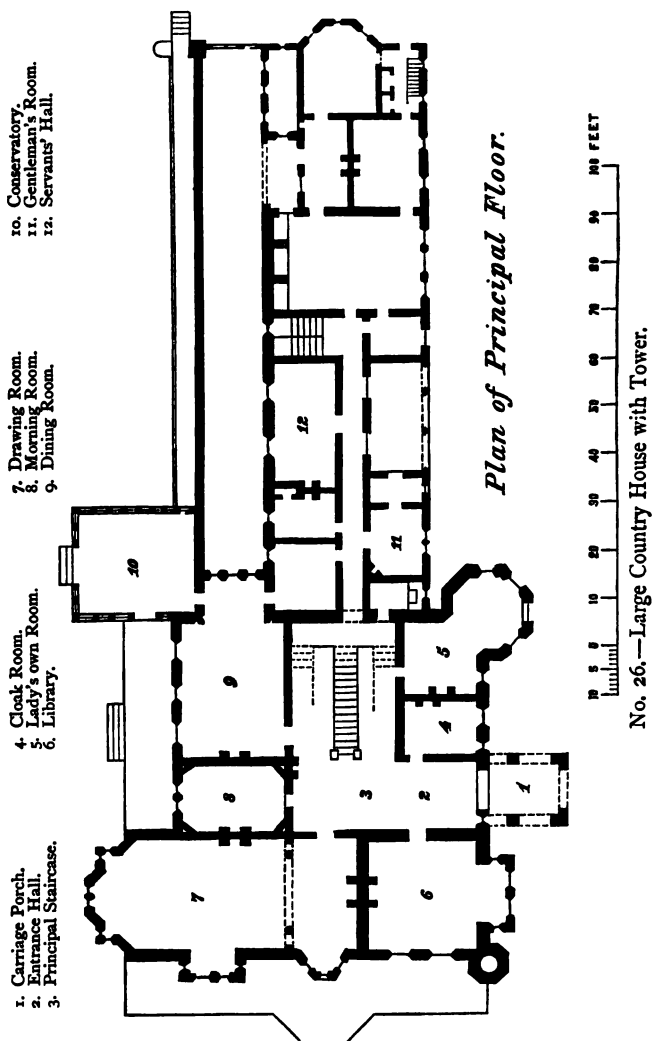
The house was built of rough stone quarried on the estate, with the arch stones and corners only roughly axed, the masonry of the walls being of the stone laid in its natural bed in irregular courses. The tracery of the window openings was formed of oak polished, the sashes opening internally therein on hinges against the splayed jambs.

The leading feature of the composition is the large square tower upon the outer corner of the entrance front. This was designed for the purpose of obtaining a large substantially built room on the upper floor at a height sufficient to command unobstructed view of a magnificent panorama that the situation afforded; the room was also wished to be fitted up as a billiard-room, and therefore the dimensions had to be considerable. The thick stone walls assisted in giving coolness during the heats of summer to this apartment, and the windows, although sufficient in number and size for all practical or ornamental purposes, had as small an area of glass as could be managed, so as to preserve the internal atmosphere at a pleasant temperature. Above this a parapet and flat cement roof carried on solid oak beams, finished to show in the ceiling of the room, served as a further open-air look-out when the weather permitted its use.

The plan of the principal floor is here given (Plate 26, page 190), and exhibits a residence of considerable extent.

In front is a carriage porch, 1; 2 is the entrance hall; and 3, the grand staircase, 22 feet in width. Attached to this is the cloak-room, 4, with toilet conveniences that the





minuteness of the scale renders it necessary to omit upon

the plan. No. 5 is the boudoir or lady's own room, with an octagonal projecting bay carried up above the roof as a tower, and affording the same feature in the room above, which is the young lady's private sitting-room, and next to it the work-room for her maid.

No. 6 is the library, 24 feet square internally, exclusive of the projecting rectangular bay in front. This room is the ground storey of the large tower which is carried up of the same large size to the roof.

On the external angle is a turret which contains a large ventilating flue connected with the ceilings of the principal rooms. In the centre is a metal pipe which is the smoke-flue of the heating apparatus placed in the cellar below, the radiated heat from which is relied upon to produce a sufficient up-draught in the air-shaft to carry off the foul air discharged therein—a result which has been satisfactorily attained in this instance.

Next to this is the drawing-room divided by an arcade into two portions, the first being 16 feet by 24 feet, with a bay window, and the other 32 feet by 24 feet, with a projecting bay rectangular in plan at the side and one of somewhat irregular design in the end. Extending across the side of the house is a wide verandah broken out in the centre by a projection following the lines of the bay of the drawing-room.

Next to the drawing-room is a morning-room, 14 feet by 22 feet, with presses fitted into the corners so as to make an octagon.

No. 9 is the dining-room, 22 feet by 28 feet, with windows opening on to a terrace, at the end of which is a conservatory, 10. The drawing-room and morning-room have casement windows conducting to the terrace, and thus gaining access to the conservatory. At the end of the dining-room is a very deep bay, at the sides of which are doors leading into the conservatory, on the one hand, and to the serving-room upon the other. Next to the serving-room

is a sleeping-room for a man-servant, with the plate-closet solidly built into an inner wall therein.

The remainder of the house comprises three water-closets, a gentleman's business-room, with an enclosed porch entered from a side arcade (used as a convenient smoking-seat), the servants' corridor with ground-glass windows towards the arcade, the servants' hall, No. 12, and the back stairs, housekeeper's room, and servants' yard entrance.

Beyond this is the block containing the kitchen, a large and lofty room, 20 feet by 36 feet, lighted at the end and by the side of the cooking apparatus, with its pastry-room, scullery, larder, store-rooms, cellar stairs, dairy, and other necessary adjuncts, and also an enclosed entry for the supplies of the gardener and others. In this is a distinct staircase to men-servants' sleeping-rooms arranged in the lower wing.

As the house is seen upon every side, the greatest care was requisite to give every convenience for domestic operations, and to permit nothing to be obtrusive; an enclosing wall was therefore carried across the rear side of the edifice, with a terrace and descending steps under a stone buttress carried up so as to form a turret for the house-bell.

Below the whole are cellars, with ample arrangements for storage of fuel, vegetables, ice, wine, and the like.

The upper floors contain seven principal bedrooms, with dressing-rooms and toilet conveniences upon the most ample scale; 2 nurseries, 5 single rooms, 3 principal servants' rooms, store-rooms, bath-rooms, housemaids' service-room, and the like, upon the lower level; above are eight secondary rooms, lofty and well finished, under the roof. There are also six sleeping-rooms for servants in the wing, and ample space for luggage and other storage. It will thus be seen that, without assuming the importance of a mansion, the house is upon a large and liberal scale of accommodation.

The cost of the whole, exceedingly substantially built,

under a mason engaged to give his whole time to the superintendence of its erection (the carpentry and joinery being by contract), was about £16,500. The estate, however, produced the stone, sand, and lime, as also much of the rough timber used for beams and the like.

### 362. Peculiar Features of Mansion.

The country-house of larger size than indicated by these examples is but an increase in plan; room after room may be added as required, or each may be increased in size until at length the building assumes the importance and proportions of a mansion. But, extensive as a country-house may be, the mansion proper should have certain features that lift it beyond the attainment of the gradually enlarged country-house, which has been perhaps built up generation after generation, until but little of the old dwelling remains. Such old-new houses, snug and picturesque as they may be, are scarcely mansions.

### § 363. Requisites of a Mansion.

The *mansion* requires to possess unity of design and dignity of effect; to produce which the working out of a leading idea must be evident. It is not intended to attempt any but general remarks upon the large and grand country-seats of England. The reader will find the subject already exhaustively and intelligently treated by Professor Kerr in "The English Gentleman's House," before mentioned; but a few matters may with advantage be touched upon.

### § 364. Avoidance of Long Corridors.

A satisfactory feature in the arrangements of the preceding plan is obtained by the concentration of the rooms, and the absence of disproportionately long corridors or passages, the only one being that leading from the great

hall to the kitchen, and which is well lighted by external windows from the arcade or retired verandah connected with the gentleman's private room and porch.

In nearly all the examples of existing old mansions, or of plans for new ones, the extreme length of passages and corridors cannot fail to attract attention.

Undoubtedly it is often difficult to dispose the apartments in such a manner as to prevent great spaces intervening between the group of principal rooms and the offices ; often, too, a separation is desirable, and distance an advantage ; but the fact remains, that long corridors are general in all our large country dwellings. It cannot be denied that their existence entails inconvenience, and that a thoughtful architect beginning a new building could arrange such plans better. But it is not often that an architect has the chance of carrying out such a plan on absolutely fresh ground ; usually old portions have to be added to, existing features to be preserved, and other difficulties come in the way, so that most of our large places are a congeries of separate portions joined together in the best manner permissible by the circumstances.

In old buildings of Gothic type, the cloister probably suggested the long corridor ; and, in the grand plans that sprang up under the influence of Palladian design, the separation of wings and the construction of long passages to connect them with a grand central mass prevail.

### § 368. Arrangements in South American Houses.

Some of the large country-houses in the island of Cuba, and in fact also in South America generally, present an arrangement which is noteworthy. The great extent of internal space often enclosed by these renders long passages indispensable, but they are always corridors and galleries within the building open upon the side furthest

from the walls. The large establishments are, in fact, a series of quadrangular enclosures connected with each other, and frequently are attached one to another within the enclosing walls of a still larger quadrangle around which the principal rooms are disposed. These rooms rarely have windows towards the street, but are open to the garden or court within; and, primitive as the domestic planning of some of these almost palaces may seem to be, they afford subjects for suggestive reflection to an observant architect.

The principle upon which the best of them is arranged is this:—the living-rooms and grand reception-saloons of the family are placed around an embellished garden court, then from the centre of one of the sides subsidiary buildings branch out, each series of which is devoted to a special service, and has all its requisites complete within itself; thus the kitchen has continued from it the store-rooms, fruit and milk rooms, larders, and the like; then starting from the same central vestibule, another branch would contain the principal room of the house-steward, and his store-rooms, wine-cellars, and the rooms of the house-servants under his charge; then another branch would lead to the female servants' apartments, the work-rooms, and the like.

To make the application useful, a block plan of an English residence adopting the arrangements thus briefly alluded to, is presented.

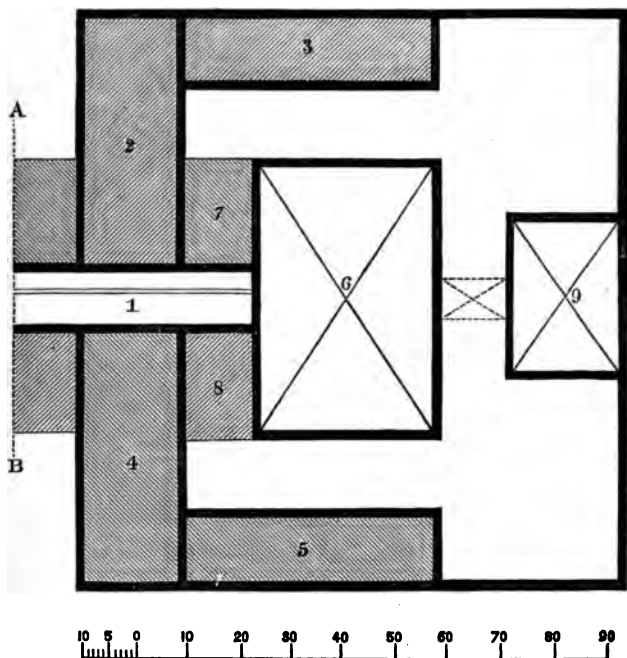
### § 369. **Block Plan of Country Residence.**

The general plan of the usual rooms in the main part of the house is not important, the connection of the offices therewith being susceptible of any convenient disposition. In the present case the plan commences at the serving-room and anteroom leading to the dining-room and central hall, indicated by the dotted line A B (*see* Plate 27, page 196).

Starting from the main building is the passage 1, which is

subdivided by a glazed screen for a purpose that will presently be seen.

On the upper side of this is an L-shaped wing, 2, containing the butler's rooms, plate-rooms, rooms for pages and



No. 27.—Block Plan of Domestic Offices.

- |                                     |                    |
|-------------------------------------|--------------------|
| 1. Passage leading to Central Hall. | 6. Kitchen.        |
| 2. } Wing for Men Servants.         | 7. Cook's Rooms.   |
| 3. }                                | 8. Servants' Hall. |
| 4. } Wing for Female Servants.      | 9. Larders.        |
| 5. }                                |                    |

footmen, lamps, brushing clothes, and all necessary arrangements for the performance of the duties of the men-servants in an extensive establishment. Part of these being subsidiary, and requiring access from out of doors, are open towards an

inner court, and make use thereof for passage of one to the other, as in 3.

Upon the lower side is a similar wing, 4, containing housekeeper's-rooms, store-rooms, still-room, upper maids', and the like, whilst in the secondary portion, 5, are laundry, drying-rooms, and such offices as also require direct external communication.

No. 6 is the large central block, comprising the kitchen, and its necessary surroundings; and between it and the wings are the rooms common to each department, being on the one side, 7, the cook's private room and own store-rooms, and upon the other, 8, the servants' hall.

Beyond the main building of the kitchens is 9, the offices of supply, such as game-rooms, uncooked-meat larders, milk-room, and the like; and to connect these with the kitchen is a glazed passage, which may be short or extended as the necessary light upon the side towards the outbuildings may require.

From the kitchen to the main house, an inner passage is partitioned off for service of the table, only the servants required for which having customary access thereto.

Each of the wings has its own staircases, external doorways, water-closets, and the like, and above each the sleeping-rooms of the domestics occupying the lower floor would be disposed. It is not intended to place any sleeping-rooms over the kitchens.

Without distributing these blocks into the necessary subdivisions, the advantage claimed may not be quite apparent; but this much will be readily understood:—each division of domestic service is separate; there are but few passage-ways, and those that exist are distinct in each division; the common hall necessary for all is wide and comparatively short; and the several departments are under the immediate control of each appropriate head, namely the butler (to use a general name for the chief man-servant) on one side, the

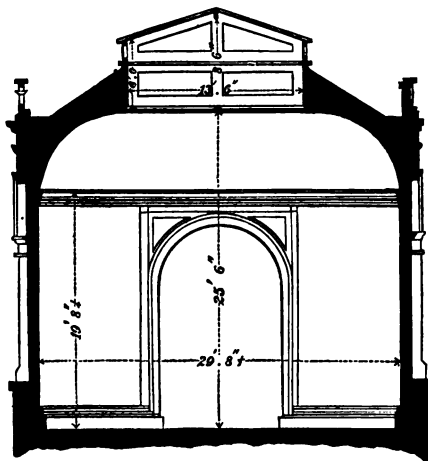


housekeeper on the other, and the cook presiding over the culinary divisions comprised in the central block.

The kitchen, being detached from, and yet so near to, the main house, would be not likely to cause annoyance from heat of cooking apparatus, odours from the requisite processes, or danger from fire. The comparative isolation of each of the wings, and the capability of safely shutting the points of intercommunication by fireproof doors, also are arguments in favour of a like immunity.

**§ 372. State Apartments beyond present scope.**

The apartments of state in a country mansion are beyond the scope of this present work, whilst the ordinary rooms



*Section of Picture Gallery*

adapted to domestic life follow the same rules in the grand house as in the modest villa. These will be fittingly dwelt upon in another section.

Attention can, however, be usefully directed to a sectional view of the picture-galleries at the present International

Exhibition, as an example of just proportions and arrangement of parts to form an entirely satisfactory building. The shadowless, even tone of the light has been so favourably commented upon that a record of the manner in which so desirable a result has been obtained is valuable. The accompanying sketch (p. 198) was obtained from the building itself by the courtesy of Major-General Scott, R.E., the architect in chief; and as the dimensions are moderate, the exact section might with advantage be followed by those who desire to erect a private gallery for works of art.

§ 375. "**Cottage**"—a genteel Country Residence.

The smaller country-house or cottage remains now to be briefly considered.

The *cottage* is the name of any rural dwelling which has an aspect rather picturesque than formal, and it does not seem always to be confined to the small residence which properly only should be so called. The house of the small farmer or agricultural labourer is a very different thing to the gentleman's country home that assumes the name.

§ 376. **Cottage of Labourers.**

The cottage proper, that is, the humble home of the working man, does indeed deserve all the study that can be given to it, but it is not the dwelling which a gentleman seeking a residence is required to choose. If, indeed, he chance to have an estate and many tenants, it becomes his duty, and it will be to his advantage, to see that they are provided with healthy, commodious, weather-tight, and convenient dwellings; but the "cottage of gentility" is quite another thing.

This has assumed such endless variety of arrangement and fashion as to be almost beyond architectural control. Convenience of plan is, of course, the first necessity; then any

prettiness of exterior that the means at disposal and the materials to be employed will permit. *Terra cotta* is to builders of such cottages a precious boon indeed, and with a copious pile of illustrated catalogues of the Watcombe Company, of Messrs. Doulton and Co., and of other well-known manufacturers of the material to select from, almost endless combinations of ornamental design may be obtained, and probably in better taste than cottages ornés generally possess.

#### § 377. Sources of Income to Jobbing Builders.

In choosing or building a country cottage, it must be remembered that it is to be lived in, as well as looked at; and however seductive the fascinations of a pretty exterior may be, the disposition of the rooms and provision of every necessary comfort must first be secured. Stability and immunity from repairs are not so often to be looked for: the many-gabled roofs and "picturesque" little breaks, so charming in the picture, are apt to lead to heavy expenses; and the first cost of really good work in these whimsical varieties is generally so great, that cheap makeshifts in most important portions of the construction are resorted to. But the day of reckoning comes, and the jobbing workman generally finds a pretty steady source of income in a neighbourhood of genteel pretty cottages.

#### § 378. Peculiar Roofs costly.

The roof is a fertile source of cost; the many breaks require good workmanship, well-cut slates, heavy flashings of lead at all valleys and junctions, and, indeed, more than usual care of highly skilled workmen. Instead of these, cement filleting is used, a common labourer turns slater for the nonce, or is entrusted with these most important portions

of most critical work ; hence the results are leaks and destruction both within and without.

§ 379. **Cottage Cheap only when well built.**

A cheap cottage, to really be so, must be not a building put up cheaply, but one using good materials in the most economic manner, arranging the plan so as to serve best the constructive necessities, and making the line of the walls and the shape of the roof of the very simplest forms. Thus only can a cottage be cheaply built ; then the ornamental details may be such as with good taste your purse will permit, always remembering that sham and pretence spoil the very best proportions and the most harmonious design.

The well-devised *plan*, commodious, liveable, and capable of being easily turned into bricks and mortar in a shapeable manner, is what is to be first thoroughly matured ; that done, the rest must be left to taste and the laws of construction.

§ 380. **Description of a desirable class of Cottage.**

There is, however, one class of country cottages which has not had sufficient attention from architects, and that is the small place required for temporary use at some particular time of the year, whether for sporting purposes, for quiet recovery of health, or for any other use.

These are sometimes modern portions of an older building, frequently a farm-house, so arranged as to be disconnected from the portion generally used by the servants or the family of the person left all the year round in charge. Whether distinct erections or attached to others, they require to be well and simply built, to be little liable to necessity of repair, and to incur no risk when left tenantless until another season.

They should, therefore, be as plainly constructed as possible, yet not without some modest and tasteful finishing ;

and the plan should be compact, and the buildings should be capable of being enclosed in an outer fence, so that, when empty, the external door and the yard gateway remain the only openings necessary to be secured.

**§ 381. Cottage for Summer use.**

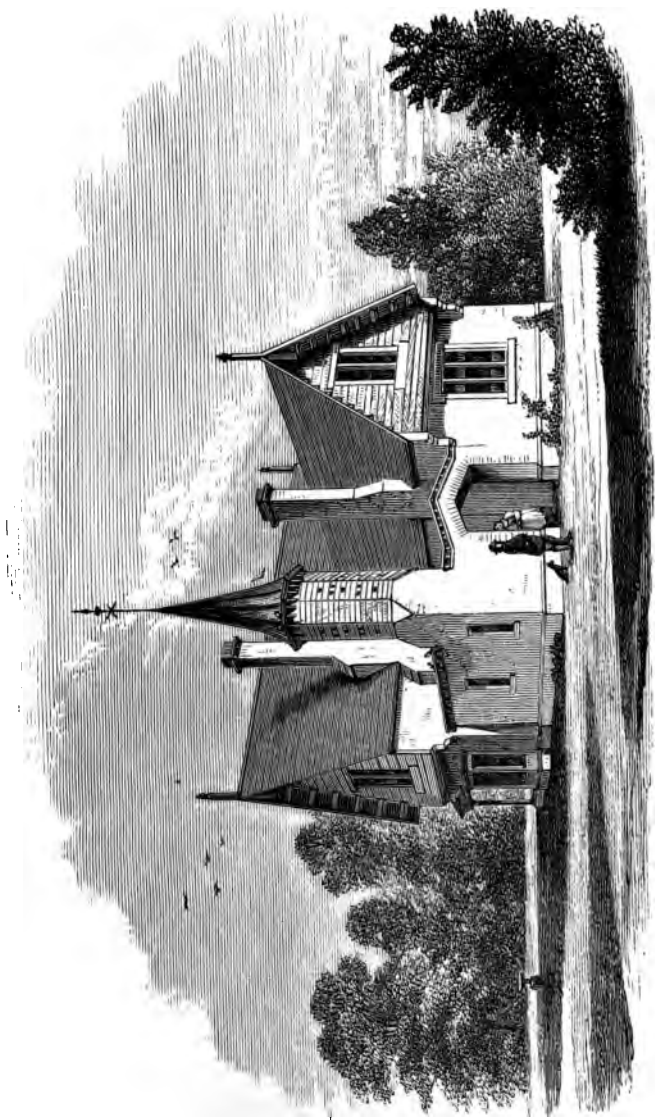
The accompanying plan of such a cottage is offered, as it is intended to meet the points insisted upon. It was built of rough walling, with the upper portions under the projecting gables carried up in wood-work, formed by oak boards laid so as to lap one over the other, and the frame filled in with small stones and good mortar. These were the materials at hand, and the work was done by ordinary country workmen at a very moderate cost.

The plan shows a simple rectangle, containing the principal rooms with a projection in the rear for the domestic offices (see Plate 29). In front is a rustic verandah, the entrance hall leading from the centre, with a room on either side, one being the sitting-room and the other for meals. Each of these rooms is about 16 feet square, with bay windows slightly projecting from the end walls.

Attached to the dining-room is a large roomy closet for private stores, and next to it a longer pantry for general use, and for china and glass, lighted by a sash at the end. The hall has at the near end a small closet, partly under the stairs, and lighted by an external window, for guns and fishing tackle, and has a back lobby serving as the means of communication with the kitchen and also for the passage for service of the table.

The kitchen is 15 feet by 16, and has at the rear a sink-room or scullery, with an outside door into the yard, and a roomy larder.

The yard is enclosed, and has a small shed roof upon the side opposite to the kitchen, for wood and other fuel.

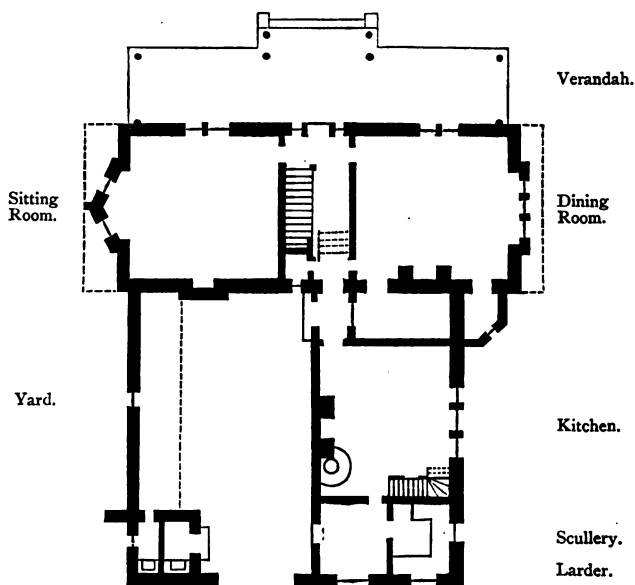


No. 28. See page 202.

SKETCH OF SUMMER COTTAGE.



In the corner is a building carried up as a dwarf tower, for a pigeon-house, the lower storey of which contains the earth-closets for the family and servants. In this case the severity of the winter made the provision of a closet, with its cus-



*Ground Plan.*



No. 29.—Summer Cottage.

tomary apparatus for water service, not desirable; but in suitable situations elsewhere a water-closet could be provided in connection with the lobby at end of the hall.

A sketch of the exterior (Plate 28) will show the character of the building, and also the amount of accommodation upon the chamber floor, which consists of two rooms in the



main part of the house of similar size to those below, a small dressing-room in front between, a third room over the kitchen, with dressing-room and linen-closets over the pantry and store-closet, and a servants' bedroom at the back, having a separate staircase thereto.

The cost of this cottage was not quite £500; but the finish was plain, and materials and labour were cheap. Inside was no plastering, the underside of the flooring boards being smoothly planed and polished, the floors being double, with thick felt between; the inside walls were covered only with canvas, which was stretched from base to ceiling, and, when occupied, hangings were put up thereon. All the woodwork was cleanly finished, and then oiled and varnished, a fresh coat (after a thorough cleaning) being put over the whole every spring.

#### § 382. *Effective Finish of above.*

The internal hangings above alluded to were of inexpensive material, attached to rods in folds, and stretched sufficiently tight to preserve their shape. The walls of the kitchen, offices, and pantries were lined with narrow boarding a short distance from the inner surface of the stone-work.

The cottage thus described was built in a romantic situation, with a farm sufficiently near to supply the table, and to furnish overseer close at hand to take charge of the place when not in use by the owner.

Such cottages would, doubtless, be more frequently built by men of moderate means, if their advantages were more thought of. Half an acre of land in a healthy and accessible site, near enough to a farm for all supplies of food, and in the midst of attractive scenery, or within reach of the sea, perhaps in a neighbourhood affording sport for rod and gun, would be the requisites to be sought for, and could be found readily at a small outlay.

## CHAPTER X.

### THE SEVERAL PARTS OF A HOUSE.

#### § 390. *The Chief Entrance.*

AN external porch, or a lobby formed by a partition, should precede the hall, to shelter those who arrive at the entrance from wind or rain, and to prevent the direct rush of cold air into the interior of the house.

In the country, and indeed in any situation that requires a carriage drive in front, a protecting roof over the space occupied by a vehicle is desirable. This may be obtained by various expedients—by a projecting awning, supported by light posts or brackets, or by a more solid erection, as in several of the preceding plans. When this is provided, the *carriage porch* becomes an important feature of the entrance front; it should be carefully composed, so as not to be heavy or too obtrusive.

#### § 391. *Should accord with Style of House.*

It should, of course, be sufficiently high, and should cover enough space to be useful; but unless the house be of considerable magnitude, and the projection of the landing and entrance-steps carries the porch out sufficiently far as not to interfere with the front windows of the principal rooms, a lighter construction is preferable to a massive finish. Iron columns upon hard stone blocks are suitable for the roof supports, or, if the style permit, rustic posts of well-seasoned timber.

**§ 392. Floor of Carriage Porch.**

The floor of the carriage-porch should be of a hard material, neither slippery, like granite, nor liable to be cut up, as loose stones or gravel; asphalte of good quality, when properly laid, is the best possible roadway for such a purpose. A sprinkling of clean, well-sifted gravel thereon will always keep the surface neat and fresh after horses have passed over it.

**§ 393. Entrance Doors.**

The entrance-doors should always be of liberal dimensions, and, if double, either half should be sufficiently wide for easy passing through. They should be turned away from facing the prevailing winds, and if the aspect compels the entrance front to be so disposed, the openings may be at the side, with steps leading on either hand,—in very exposed situations, to be used respectively as one or the other may be more sheltered.

**§ 394. The Lobby: Position, Floor.**

The lobby should be well lighted, and sufficiently large to always permit the inner door to be closed before the outer is opened, so as in no case to have them both open at once. It should contain receptacles for wet umbrellas and outer garments, and in large establishments should have a cloak-room or small dressing-rooms attached. Its floor should be well covered with mats or other removable porous substances: a bare tile, marble, or stone outer vestibule, without abundance of these, is most uncomfortable, and leaves the visitor chilled and ill at ease.

**§ 395. The Hall: valuable for Air Supply.**

*The Hall* should be in the centre of the house, so as to

afford ready access to the different rooms, and spare the necessity of passing through one room into another. It should be of size proportionate to the space afforded for the whole house; not too large, for that entails waste, nor so small as to be sordid. When capable of being so arranged that no external doors or windows open directly into it, the hall may be a most important aid to the warmth and healthful ventilation of the rooms connecting with it, and on this account somewhat more of space may be given to it than the dimensions of the rooms would seem to require. It should have free ingress of pure external air for summer use, and be capable of comfortable warming in cold weather. Then, when a door is opened, fresh air accompanies the act; whilst in winter-time the draft is not felt, because the temperature within and without the rooms corresponds.

The modes of warming will receive attention in the next chapter; but, whatever they may be, a cheerful fireplace in a hall of any size is indispensable.

In a well-devised plan, the hall should be more than merely a passage or a space for the principal stairs. In some cases it may form a valuable portion of the space devoted to large gatherings, and in all it should suggest habitancy and domestic use. Putting a billiard table in it seems, however, always a mistake; the players are inconvenienced, and, when the table is not in use, valuable space is appropriated. Pictures, plants, and bright and cheerful objects of art are fitly arranged in a hall, the light of which, being often from above, may be made peculiarly suitable for their display.

### § 396. *The Staircase.*

The *staircase* should never seem to lead directly from the front door; in even the smallest house it may be screened by an inner partition, and in all plans the ascending flight

may be placed upon the sheltered side, so that, on coming in, the direct communication with the upper floor may not be seen. The height and width of a step affect the comfort of the ascent of the stair; frequently a shallow step is found more tiring than one of steeper rise.  $6\frac{1}{2}$  inches height of riser, with 12 inches for the tread, will give a comfortable and convenient stair; but if the space will not permit so much as 12 inches for each step, and  $10\frac{1}{2}$  or 11 be compulsory, then the rise must be increased to 7 inches or even  $7\frac{1}{8}$ . For a large and stately stairway with a rise of but  $5\frac{1}{2}$  inches, or even less, the width must never be less than 14 or 15 inches. A useful rule is, that the rise and tread added together should represent the proportion of 7 and 11, which is, as Professor Kerr says, "the ascertained standard of ordinary stairs;" so that a rise of 6 inches would require 12 for the tread; one of 5, 13, and so on.

#### § 397. Long Ascent should be Broken.

The direct line of ascent of a long stairway should be broken to secure ease: one continuous flight is tiresome, and of unpleasant appearance. There should, however, be a harmony of arrangement in the breaks: nothing is more perplexing and unsatisfactory than an occasional single step after continuous flights of longer or shorter intervals. The landing, then, should be level, and the first stage should consist of more steps than those which succeed, unless some special arrangement so easily seen that the user adopts it almost instinctively is necessary. Hence, in practice, an oval staircase is tiresome, that is, if of continuous steps; for the body gets accustomed to the long sweep of the centre of the flight, and is embarrassed by the shorter radius at the turns, whereas in a straight flight, even with winders at the turn, the change of motion is so abrupt that the limbs adopt it at once, whilst in the former case the change in the

curve causes embarrassment; in other words, a straight line ending in a curve is more easy to follow than consecutive curves of different degree.

The width of a stair is a matter of plan, and, so long as it is never less than a clear three feet in width, it is sufficient to answer all purposes of convenience.

#### § 398. *Lighting of Stairways.*

The lighting of a staircase should be obtained in such a manner as to be free from glare of the direct rays of the sun; it should also never be carried across an exposed window, nor should it depend upon borrowed light which the necessity of any internal re-arrangements might at any time destroy. When light from above is relied upon, the height from the top of the ceiling to the outside of the roof must not be great, or difficulties will occur. The best form of upper light is one by which a small aperture at the top comes in immediate contact with the direct external rays, and the sides are closed as to transmission of *light*, but capable of being open for the free passage of currents of air for ventilation. If owing to the height from within to the surface of the roof a glass ceiling is necessary, it should not be flat, but with coves or sides at an angle, and with perforations therein; the central position will receive and transmit the direct rays of light, and the openings permit the escape of heated air, and the passing in of the fresh external atmosphere.

#### § 399. *Separation of principal Stairway from Offices.*

The principal staircase should be separated by a lobby with enclosing doors from the back stairway and kitchen passages; and this should have, if possible, an external window upon the upper level. This will go far to prevent escape of odours from the kitchen into the hall, and their permeation of the staircase.

### § 402. The Family Living Rooms.

*The Dining-room.*—This should be near or on the same side of the house as the kitchen, and the passage connecting it with the offices should be so shut off as to prevent either the necessity of crossing the main hall with dishes, or the exposure of the domestic economy to the guests.

### § 403. The Size of Dining-room.

In determining the size of a dining-room, regard must be had to the extent of the house, and the number of guests that are likely to be entertained. A dinner-party ought not, as a rule, to extend beyond twenty to twenty-four persons, or it is no longer a private but a public dinner. To admit of a fair-sized dining-table, and to permit the servants to pass round at the back of the chairs, a less width than 16 feet is inconvenient; but the width will somewhat depend upon whether the fireplace is at the end or the side of the room, the former position affording the greater space. The length of a room 16 feet in width should not, as a rule, be less than 24 feet, and may be increased to 28 feet without appearing long for its width, especially if there are windows at the sides. Such a room should be at the least 12 feet in height, and more if the scale of the building will permit.

### § 404. Position of Doors.

The position of the doors of a dining-room is a matter of importance. Where there is a door for the entrance of the family, and another from the serving-room for the domestics, the position of the former is not of so much consequence, as it will remain closed during the meal; but when one door only, as in many town houses, serves for both, it should be so arranged as not to disturb the guests when once seated. Its best position would then be at the end nearest to the

sideboard, which would serve also as a buffet on a small scale. In such a case the door should open towards the end of the room, not, as ordinarily, towards the interior so as to expose to view as little as possible the passage to the offices and the removal of the dishes. It should, however, be hung on hinges wide enough in the joint to allow it to swing clear back against the wall when the guests enter or leave the room; after which it would open only sufficiently wide to admit the service of the table. This in practice will be found an important point.

#### § 405. *Furniture of Dining-room.*

In regard to the furniture of a dining-room, it may be said as a general rule that the present taste inclines too much to heavy drapery and to deep and gloomy colours. The woollen materials of which curtains are composed are too porous and retentive for satisfactory sanitary results, and there is always too much drapery at the heads of the windows, preventing the possible circulation of air when a top sash is dropped, and retaining all the effluvia of many hot meals.

#### § 406. *Aspect of Dining-room.*

The aspect of a dining-room should be chosen in a part of the house on which the hot or slanting rays of the summer sun would not be directed at dinner-time; but if the room have two external walls, end and side, and the look-out requires either of them to be directly west, the only mode of obtaining relief will be by closing well-fitting blinds to shut off the sunny exposure, and depending upon the light from the other.

#### § 407. *Decoration of Dining-room.*

The decoration and colouring of the dining-room should be quiet and unobtrusive; the walls a neutral tint of either



one uniform colour, or diapered in shades of the same; the dark crimson flock papers, once so much in vogue, appear particularly oppressive to an eye that has become accustomed to a lower tone of colour. A *dull* gold in the pattern of the wall-hangings or painting has a rich and broad effect, and "lights up" well. If pictures are to hang upon the walls, the selection should be limited to a few pleasant, rich, and cheerful designs: many paintings, so as to entirely cover a wall, are distracting to the attention, and reduce the room to the level of a sale-room. A succession of well-selected works of art, occasionally changed, and so hung as to bring but one at a time to observation, is in better taste. Why a dining-room should, however, be the sombre apartment that it usually is, seems difficult to explain; certainly ideas of "snugness and comfort" can be as well met by elegant colours, like those in the examples left to us of the refined taste of the luxurious Romans, as by the deeper tints of the prevailing fashion. The same comfort and warmth are attainable, and the dark, dingy mornings at breakfast and lunch hours are made more lively in a more brightly toned room.

**§ 410. Light Oak not favourable.**

Oak furniture does not seem to harmonize well with modern use of a dining-room, at least not that which is newly made. The dark rich tint of old oak is warmer; but the cold, dull, unreflecting surface of light oak is too positive for a general harmony of effect. The choice of wood for such furniture is too limited; there seems no reason why light and bright colours, such as our cabinet-makers use for other rooms, should not be employed in the dining-room. The dark, deep tint of old Spanish mahogany is certainly very rich, particularly when employed upon broad surfaces and in bold mouldings, relieved with ebony or its imitation.

Carvings in this wood are not so effective, and a well-designed piece of furniture should exempt their introduction, excepting for occasional relief of large plain faces.

When using mahogany, the key of the whole colouring must be rather grave than bright. A dull green, relieved with gold, for the walls, with a maroon band of decoration above the base, and repeated in the cornice of the ceiling, will be found to result in harmony.

**§ 411. Too much Woodwork not desirable.**

In a room with pieces of furniture so large as those of a dining-room (the same also of the library), too much woodwork is not desirable; therefore the doors should be of tints to suit the wall, rather than either natural woods polished or graining in imitation of woods. This, it is true, is not the usual practice; but the idea will, on reflection, prove correct.

**§ 414. The Serving-room.**

To every dining-room should be attached a serving-room communicating with the kitchen, or the thoroughfare leading to it. This in a small house may be but a large well-lighted pantry, with a sliding panel towards the offices for service of dishes; in establishments upon a larger scale, it should be roomy enough for the kitchen servants to supply those within the room; and it should be fitted with broad shelves, folding or hanging tables for dishes, and a sink with hot and cold water. Where space will permit, a farther pantry should be attached to this, provided with enclosed shelves, with drawers for glass, china, knives, and the plate and linen in use: this is preferable to disposing them in the buffet or serving-room, as the whole space is left available for collecting the courses, and depositing the trays. A good example of this is seen in the large country house, plan No. 26.

**§ 418. The Library.**

The cases for books supply the distinctive feature of the room, and are a part of its internal design. The wall space should therefore be as extensive as possible ; only one door; a fireplace, windows at the end, and sometimes in the sides, and, when space permits, a recess for a table, with light at side and front, so as to secure the best aspect at different hours of the day. The book-cases should always be lined at the back with well-seasoned panels, or strips placed about an eighth of an inch apart. They should stand clear from the wall, so as to allow a circulation of air behind ; and if the projection of the base of the room would bring them out too far, this may stop against the ends of the cases. But under all circumstances there must be an interval of an inch or two between the back of the book-case and the inner surface of the wall, to secure the books from damp.

**§ 419. Book-cases in Recesses not good.**

The cases are not so well placed in a recess, unless a circulation of air has been secured around their sides and back ; but placed in such a position, it is difficult to secure as perfect dryness as when they stand distinct from the wall. All external walls of a library should be cemented on the inner surface, and when thoroughly dry should be battened, and the inner lining, whether plaster or woodwork, then put on. These precautions should always be taken when valuable books, or a large number, are intended to be shelved.

**§ 420. Aspect should afford Change of Light.**

The aspect of a library should, if possible, afford for one of the windows a north light, or, if that be not possible, one directly west, so that the room may be used all the morning ;

and when the late afternoon sun becomes unpleasantly familiar, its beams may be curtailed out, and a second window be resorted to. Generally, too, in use, the library is not so steadily occupied in the afternoon as in the rest of the day; this, however, must of course depend upon the habits of the occupant.

**§ 421. Let Window Blinds roll from bottom.**

A useful arrangement for modifying and confronting the window light in a library will be found in having roller-blinds fixed at the bottom of the frame instead of at the top, with a cord passing over a pulley above, and so allowing the light to be received from the upper part of the window. In bright weather a blind so disposed will be found an exceeding comfort. Venetian blinds can be put up in the same manner.

**§ 425. The Drawing-room.**

The *drawing-room* should be light, cheerful, and elegant; to this all will assent; but how to make it so is not so easy to define. The size and plan of the room should always suggest the decorative treatment and appropriate furniture. The stately, unbroken parallelogram of some rooms requires symmetrical arrangement in all their details; the irregular room permits endless variety. A safe rule is, that whilst all may be bright and beautiful, nothing should be obtrusively striking. This is a difficulty readily admitted in small rooms which contain the usual large chimney-glass. The effort must always be to compensate for the overwhelming obtrusiveness of that brilliant and striking feature. On the principle of "like curing like," a favourite arrangement is to repeat it in another form at the other end, and in the reduplication of the joint reflections, to obtain appearance of greater space with much seeming variety. The use of mirrors in any shape is a difficult

problem, and there exist no satisfactory canons of taste for regulating it ; but the only remark practically useful is, that a mirror is best employed when the decorations of the remainder of the walls are bright and well detailed. A looking-glass, however large and handsome in itself, in a room with light-coloured, plain, unbroken walls only makes the bareness more palpable and unpleasant. The vulgar taste that permitted mirrors in ceilings, with all the grotesque contortions consequent, is no longer rampant, but there have not been wanting advocates of the plan.

**§ 426. Woodwork of the Drawing-room.**

The woodwork visible in drawing-rooms, and such other apartments as are devoted to company or to the use of the ladies, should be certainly *not* treated as woodwork. There always seem an incongruity and rudeness about grained doors or polished maple, however finely executed, of which the popular taste seems cognizant, by the fondness shown for mirror panels with gilding and other modes of rendering the woodwork as little palpable as possible. (See sections further on.)

**§ 427. A good Floor the first requisite.**

One matter should always be thoroughly attended to in constructing a drawing-room—a *good floor*; the absurdity of sparing comparatively a few shillings on this part of the house when building, and subsequently covering a poor floor with a costly carpet, is too obvious for comment. The floor should be of hard, narrow strips, thoroughly well put together, and perfectly true and smooth. If a house be taken, in which the floor is not what it should be, it will be a more true economy to take it up and relay it properly than to sacrifice a beautiful carpet every alternate season. When the drawing-room is large, it should be provided with com-

fortable nooks or bays, free from draught, not far from the fire, nor near the door, wherein the members of the family circle may dispose themselves without formality. Its position should be central, and yet not so as to directly communicate with the dining-room, but with an anteroom or interval between.

With the drawing-room, all other family rooms may be similarly considered, and can scarcely receive special remark.

#### § 430. *Billiard-room.*

The *billiard-room* is now a recognised adjunct to a fairly spacious house. It should be well lighted, if possible from above, retired from the main rooms, and of dimensions suited to the size of the table. 16 feet by 22 is the very smallest space that will admit a table of useful size, and beyond this there is no reasonable limit. There should always be a clear space of four feet outside the table, for the free exercise of the cue. When capable of being placed as a wing without rooms above, the best system of lighting and ventilation is readily available; but when occupying the usual relation to the rest of the house, there should always be a copious air-duct leading from the centre of the ceiling to the external air, both to carry off the excessive results of combustion of the required artificial light, and the cigar fumes which more or less are to be looked for in such a room. (See sections on "Ventilation.")

#### § 432. *Gentlemen's Rooms.*

The *gentlemen's rooms* are suggested in nearly all the preceding plans. They should be arranged conveniently near the library, and with a separate external approach, so as not necessarily to use the main hall for access. Their fittings and finish will be in accordance with their use and the taste of the owner.

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**§ 435. Kitchens and Domestic Offices.**

The *kitchen*, with its adjuncts, is one of the most important departments of the house. If possible, let it be upon the same level with the principal floor, or at all events with the dining-room. It should be well lighted and ventilated, with windows opening close up to the ceiling.

It should be as near as possible to the dining-room, with the means of access to it capable of being shut off. The *serving-room* and its accessories have been already alluded to, and fully illustrated in every plan, even that of the smallest dwelling.

When the kitchen floor is upon a lower level than the dining-room, a lift should communicate from the upper to the lower serving-rooms, and the staircase should be of easy ascent, sufficiently wide and free from windings.

**§ 436. Cooking Apparatus, Ranges.**

The cooking apparatus should be well lighted, and, in addition to the side window, it is well, when possible, to contrive one immediately over the hot plate; this can only be done in an external wall; but a direct light for delicate culinary operations is obvious. The ordinary range is in favour with some housekeepers; but it requires a separate fire for nicer processes, so that an enclosed kitchener or other cooking-machine is preferable. Of these, the largest (in moderation) will generally be found the cheapest in use. The first necessity is a very large oven; frequently they are too small, and consequently become overheated. The amount of fuel consumed in one of fair size is not greater than is necessary for a smaller one, and with proper use there is little difference. An important matter is, that the sides of the fire-grate are thoroughly lined with fire-brick or soap-stone, so that the fire may not come directly in contact with the cast-iron boiler, water back, or oven, or these will soon

crack and be destroyed. Another precaution to be seen to is the frequent cleansing of the boiler; for, with nearly all the waters used for house supply (excepting filtered rain-water, the very best of all), deposits take place under the action of heat, which soon crust up the boilers, and are liable to cause their speedy destruction.

As a rule, all our ranges consume far too much fuel, our system of cookery being wasteful in the extreme. The necessity for direct heat for roasting and the like is one cause of this—probably the principal; and the faulty construction of our fireplaces the other. To these must be added the unreasoning and wasteful habits of servants, and the absence of other provision for warming the kitchen when cooking is not going on.

The amount of waste heat lost up the chimney is enormous; the intention of a well-made range should be to utilize nearly the whole, and in many American machines this is really accomplished. French cooks, it is well known, achieve marvellous results with a few handfuls of charcoal, but the nearest approach we have to any heat-saving arrangement in ordinary use is the hot plate.

The best test of economical application of the fuel will be found in the small amount of heat given out in front; the best cooking apparatus being the one which is most bearable to stand over. Excepting the large hot grating for roasting, some of the kitcheners of the large hotels are quite cool at a short distance; only when an oven door or the like is opened and the hot inner blast is diverted, is the great force of the fire felt.

#### § 440. **Avoid many Cupboards in Kitchen.**

A multiplicity of cupboards about a kitchen is an evil; their use encourages untidiness, and they are harbours for vermin. A dresser, as usually seen with its drawers and



shelves, is, of course, necessary ; but for articles taken out to be used when wanted and put away again, appropriate store-rooms and pantries are better than many cupboards and enclosed receptacles. Near to the fireplace, and at the right hand, if possible, a very convenient contrivance is a shelf, containing two or more enamelled or earthenware shallow pans, with a lid to shut down over them. This could stand upon legs or brackets, under which the flour-chest would conveniently be placed.

**§ 441. Small Sink near the Range.**

A small, cleanly finished sink, with cold-water tap over, is also a very useful appendage in the immediate vicinity of the range.

**§ 442. Sinks should be open beneath.**

All sinks should be open underneath, and should have no woodwork about them ; galvanized iron or zinc are the best materials for frames and supports.

**§ 443. The Larder.**

In close vicinity with the kitchen should be a commodious *larder*. Its first quality is coolness. It ought therefore to have an aspect either N. or removed from the S. or W. It should be sheltered outside in the country by trees from the sun, and it should have a free current of air through it. The walls should be thick, and it would be well to have them double, with a space between. Tiles or slate form the best lining for the inner walls. The floor may be of hard concrete and cement, which in some respects is better than tiles. The ceiling under the roof, if of one story, should have an air space above it, and should be frequently lime-whitened.

The window-apertures should be rather numerous than large, and should be fitted with metallic gauze for ventilation.

In hot or close and "muggy" weather, cotton cloths hung inside the windows, and kept constantly moistened with diluted "*Condyl's Fluid*," will materially assist in lowering the temperature, and in keeping the air within the larder free from impurity.

The larder should be removed from fireplaces, chimney-flues, and wash-houses, and it should not be too light. To secure a perfect arrangement, its door should open into an entry with a second door, so that the danger of heated air finding entrance may be diminished. There is a reasonable doubt whether many elaborately contrived larders are not too *dry*. Dampness, of course, must on no account be permitted (for, if arising from faults in construction or soil, the evil of impure air always accompanies); but *imparted* moisture of the free current of air circulating around is not objectionable, provided it be the moisture arising from evaporation of pure water. The principle lying at the root of this is now warmly contended for by those who have made ventilation a study; but on account of *moist, elastic air* being confounded with *dampness*, there is a danger in advocating its presence in general terms.

**§ 445. Larder Walls must be kept Dry.**

On the other hand, whilst not forbidding a soft, cool, moisture in the air of a larder, the walls must be absolutely dry and non-absorbent. Frequent wiping of the walls, shelves, and floor is enjoined to remove the exhalations from meat or cooked food, which the lower temperature of the walls will collect in considerable quantities, and which, as a rule, servants are not careful to remove. The larder should be carefully wiped out all over every morning and evening, with flannel cloths wrung out in the same diluted disinfecting fluid before mentioned. The author's personal experience in a hot climate abroad, and of the damp and heavy air at home, fully enables him to confirm this.

*Dairies, game and fish larders, fruit or vegetable rooms, require the same attention, and do not call for individual remark.*

Where these are in outbuildings of one storey only, it is a good plan in hot weather to spread canvas on the roofs and to keep it saturated with water.

#### § 446. Wine Cellars.

A *wine-cellar* to be useful should have no external wall, but be removed from all influences of atmosphere, so as to retain as nearly as possible the same temperature at all seasons. It should contain at least two divisions—an outer one for dispensing the wine, and inner compartments conveniently subdivided for storage. The newly introduced metal bins allow the packing of an increased quantity of wine in a small space, and render shelves unnecessary.

In some parts of America a custom prevails of ripening wine—especially Madeira—under the hot roof, a common plan being to line the undersides of the rafters with slates to deposit bottles; it is the fact that wine so treated rapidly matures, and by removal to a cooler temperature is quickly in a condition for the table. In the present day, however, the custom of “laying down” and keeping wine for many years is not so prevalent as formerly; but for sherries, Madeiras, and some other wines that require rapid preparation, an attic room might well be employed in preference to the cellar below ground.

#### § 447. The Laundry.

The laundry should have conveniences for artificially drying clothes in wet or damp weather. When there is a furnace or hot-water apparatus to heat the house or conservatory, the spare heat therefrom can easily be utilized for such a purpose, or gas may be made available. A folding rotary “horse” is convenient, and may be hung below the

ceiling in a current of air obtained through windows or by artificial means.

**§ 448. Rain-water Supply.**

The floor of the washing-house should be paved or of cement and concrete, with channels for the escape of water. The soft rain-water cistern should supply this room either by a pump or by natural flow. In a house with large garden the soap water is valuable as a manure, and should not be allowed to run to waste ; a movable tank on wheels is the most convenient and cleanly mode of securing it.

**§ 449. Bed-rooms.**

Spacious apartments for sleeping in are indispensable. Pure air is more necessary at night than at any other time, and can only be enjoyed in a room of good size. Three thousand cubic feet is the smallest breathing space that should be permitted for a sleeping-room for two persons, and that would be contained in a room about 14 feet by 16 feet and 10 feet in height. The space in such a room, moreover, should not be lessened by large pieces of solid furniture, as chests of drawers and wardrobes ; indeed, the less furniture of any description in a sleeping-chamber, the better for healthful ventilation.

**§ 450. Windows and Fireplace.**

The room windows and fireplace should be so disposed that the bed may be out of the direct line of draught. Circulation of air is insisted upon ; and if no other plan suggests itself, an unclosed window in an adjoining dressing-room with the door open between is desirable, and if so placed as not to blow upon the head of the bed is not likely to be injurious on the score of cold.

**§ 451. Toilet Accessories.**

To permit as free a space as possible in a sleeping-room,

toilet accessories in the way of washing-closets, wardrobes, and dressing-rooms opening from the room are desirable. Many examples of the bed-rooms thus provided are offered, notably plans Nos. 3, 4, 8. The bed-room thus devoted literally to its legitimate purpose need never look bare and cheerless, for the toilet comforts adjoining would prevent such an impression; moreover the bedstead with its bright and delicate drapery, the toilet table, and cheval and other glasses, the mantel with its ornaments, and the walls with appropriate pictures would present a cheerful and pleasant aspect.

One great recommendation of a bed-room thus arranged is that the carpet, having no heavy furniture resting on it, can frequently be taken up and aired, and the floors cleansed—all most valuable sanitary usages. In a country house built a few years ago under direction of the author, the few pieces of furniture permitted in the bed-room were all supported upon brackets from the wall, so that, excepting the bedstead and the chairs, nothing rested upon the carpet, so that a clear field was left for sweeping and for its rapid removal.

#### § 452. Evil of Heavy Hangings.

Heavy hangings about bed-room windows are not to be recommended; but an extra roller blind of dark green linen or thick silk to exclude the light is always a comfort.

If an old-fashioned four-poster is retained, the head of the bed should not be filled in with any drapery, but left open to the ceiling. The accumulation of dust and exhaled deposits on such a canopy cannot, even with the most cleanly and careful servants, be prevented; besides which, the air space at the point where its free extent is most valuable is contracted by bringing the head of the bed between the sleeper and the ceiling.

**§ 453. Arrangement of Bed-room Floors.**

The arrangement of a bed-room floor should embrace three features—quiet, easy access, convenient service from the servants' portion of the house.

The quiet of sleeping-rooms is best secured by the careful separation of all thoroughfares, such as servants' corridors and stairway, from the main part of the house by intermediate lobbies and the like. Easy access from the principal staircase and upper landing is of course essential, and is purely a matter of intelligent planning, whilst the convenience of service will depend upon the disposition of the rooms and their passages towards the servants' lobby and own staircase.

**§ 454. Lady's Maid's Room.**

For further securing ready attendance, the rooms of such servants as are in demand for the bed-rooms should be conveniently near the family bed-rooms, the lady's maid's room for instance within easy reach of her mistress, the nurse and nursery, equally accessible, and the sleeping-room of an upper man-servant so placed as to be within ready call from the master's dressing-room. All these features are important, and with due thoughtfulness they can be secured. Speaking-tubes and signal bells assist materially in making the service of servants more readily available, and with less expenditure of time and fatigue.

**§ 455. Linen and Clothes Closets.**

A general rule in regard to all store-rooms is, avoid woodwork as much as possible. Metal, as, for instance, zinc or lead, non-porous materials, as slate, glass, tile, or cement, are suitable, and not expensive when repairs and painting are calculated. The comfort of knowing that

moths and vermin may be prevented from harbouring is sufficient return for the increased outlay. These are better, moreover, always if their fittings are added after the general finish of the house. Let the floors, the plastering, the ceiling all be completed, and then the casing or inner lining of these portions of the house may be fitted in afterwards—floor, ceiling, walls, all separate and distinct from the general construction.

These precautions will secure the closets from apertures or spaces having been carelessly left by workmen for the free entrance of unwelcome intruders or for bad air, or dust, and add very little to the cost.

All windows in rooms or closets in which garments or woollen articles or furs are kept should have wire gauze permanently stretched on the outside frames, so that when the sash is open no insects may get in: much mischief arises from neglecting this. It is said that shelves or linings of *red cedar* are so obnoxious to moths that articles stored in rooms so fitted are never attacked.

#### § 457. Bath-rooms.

The walls and ceilings of these should be non-absorbent; tiles, marble, slate and cement, or less expensively finished varnished papers, accomplish this. The floors should be either of tile, which is, however, cold and slippery, or they may be of wood, carefully filled at the joints and round the base and then painted, which is a cheap and cleanly mode of finish, and with cotton mats for the feet is as comfortable a bath-room floor as could be wished. Oil-cloth or the artificial floor coverings of similar kind are not recommended, for the floor is left covered too long, and damp and mildew are apt to collect. Of course for all of these, efficient ventilation is indispensable, the general means of obtaining which will be described in a later chapter.

**§ 458. Summary of Hints on Construction.**

A brief summary of matters to be noted concerning the constructive parts of a house remains to be offered, as a sequel to the chapter devoted to materials and their proper employment.

**§ 459. Foundations and Drainage.**

Spare no cost in making the foundations thoroughly solid and permanent; and implicitly follow the rules offered for the drainage, remembering especially to provide an adit pipe from the head of the drain extending above the roof, for escape of foul gas from the sewer, and adding a similar but smaller pipe to each soil-pipe carried up in like manner. "Prevention is better than cure;" and it will be cheaper, as it certainly is easier, to carry off the foul air than to struggle to shut out its entrance by traps and valves alone (*see* 29, 30).

**§ 460. Benefit of substantial Walls.**

In whatever point economy is proposed, do not let it lead to scamping the walls of their proper allowance of material and thickness. Not only the durability of the structure depends upon the fitting strength and thickness of the walls, but much of the internal finishing is endangered if the walls are not sufficiently stout to exclude cold and wet, and avoid settling and shrinking.

**§ 461. Increase Thickness of exposed Parts.**

In exposed situations it may be prudent to increase the thickness of the external wall that faces the prevailing cold, or rain-bringing wind, and it must be remembered that an extra half brick in thickness, or a coating of cement or slate, adds not much to the cost, but very greatly to the warmth and comfort of a dwelling.



**§ 462. Inner Surfaces should be Battened.**

The inner surfaces of all external walls should be battened, and the battens filled in with occasional strips between, to prevent passage of rats and mice. The stratum of air thus enclosed between the wall and the plastering is an effectual non-conductor, and makes the interior warmer by retaining the artificial heat imparted by fires, and cooler by preventing transmission of heat from the outside. Many objections have been made to the inner wooden lining thus employed, and various substitutes recommended, but for ordinary houses nothing satisfactory has yet been employed in the place of battening. There are practical objections to hollow walls unless when of great thickness, and as ordinarily built they are frequently receptacles for four-footed vermin. If expense is not an object, there is a mode that can be well recommended, of using rough walling tiles backed with earthenware slips, which are built into the wall and receive the edge of the tile, leaving a clear space between. The surface of the tiles is then smoothly coated with cement, and any finish that is desired can be employed.

**§ 463. Damp Walls preventible.**

Damp must be prevented rising up the walls by a course of slate, or asphalte, or "damp-proof bricks" laid under the floor joists and immediately above the ground. In very exposed situations it is a good plan to lay a similar course a foot or so below the level of the roof gutter, which sometimes overflows, and in violent gales the water is driven against the upper part of the walls, and by constant repetition finds weak places for saturation. The damp that collects upon the face of walls, and arises from condensation, can only be got rid of by fires and by a free ventilation. When the inner surface is varnished or painted, or is of a non-absorbent character,

frequent wiping is advisable during a sudden change of temperature, as for instance a rapid thaw after a long frost.\*

\* The following observations by Mr. T. Roger Smith, from the "Food Journal," are much to the point :—

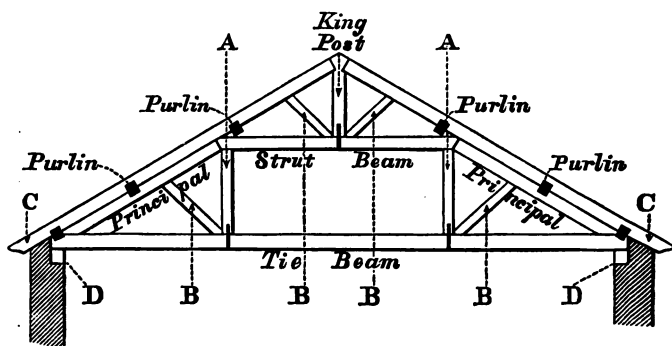
"It only remains to suggest to those persons who unfortunately find themselves in a damp house which they cannot leave, that they ought to use as many remedies as they can, rather than only one at a time ; that, as far as possible, what is done should be done in dry weather ; and that the repairs or remedies attempted should be carried out with good materials and labour, in the most thorough way possible, and under vigilant supervision. Damp is most insidious, finds its way in at very small and very out-of-the-way inlets, and when once established seems very loth to be disturbed. Those who build for themselves will, we hope, not overlook the very just importance of the simple precautions necessary to keep their houses dry ; but we should be especially gratified if these observations induce some of our readers who rent houses to bestow some little pains in ascertaining, before they take a house, if these precautions have been attended to or not. *It is wise to try to select a wet day for looking over a house*, for if the day be fine, and the weather dry, damp spots as well as many other defects may be easily overlooked. Let the intending tenant look for the existence of damp courses, dry areas, and ventilation under floors ; let him avoid a ground floor that is not a little raised above the earth outside, unless he is sure there is a good cavity under it well ventilated. Bricks that are manifestly porous or which change colour very much when rain falls, parapets with no copings, walls where the pointing is not thoroughly sound, eaves without gutters, and the like, are to be looked upon with great distrust ; and an unsound roof or ill-arranged gutters (of which, by-the-bye, few non-professional persons can form a good opinion) ought to be looked upon with as much disfavour as a dining-room of the wrong shape, or a drawing-room that looks gloomy. In one word, in choosing a house in which a man intends himself and his family to live, he should look out for the indications of damp as pointing out the presence of one of the most serious enemies to the comfort, if not to the continuance, of their life which he can have to encounter." One result of damp on the ground stories of buildings is DRY ROT, a fearful enemy and rapid destroyer, if not stopped in time. The growth of this fungus can only be arrested by admitting a thorough current of air through every part of the building where it has shown itself, and washing the places in the first instance with corrosive sublimate.

### § 465. The Roof.

To secure a thoroughly sound roof, properly water-tight, and likely to remain so, the frame must be stiff, and the timbers of sufficient scantling. This is the first thing to be looked to, and before buying a house, if leaks appear on the roof, even if they can be accounted for by defective slates, always suspect a deeper cause, which may often be found in the settling of the rafters or the shrinkage of timbers in sufficiently stout for the purpose.

### § 466. Description of strong simple Roof.

The simplest and at the same time strongest roof for an ordinary house is one composed of a tie-beam resting upon



No. 30.—Simple Truss Roof.

A.A. Queen Post.  
B.B.B.B. Braces.

C.C. Common Rafters.  
D.D. Wall Plates.

a wall plate, with a principal strapped by an iron at the foot to the tie-beam, and the common rafters resting against a pole plate with purlins at intermediate distances. Upon

the tie-beam are two queen-posts, across the top of which is a strut-beam, the whole forming a truss of great strength.

For a roof of considerable span, a second truss is necessary to support the upper part; this should consist of a king-post and braces placed as shown in the accompanying sketch.

Such a frame can be made to any pitch, and is equally applicable to a gable or to a hipped roof. Unless of great width, the scantling of the timbers may safely be settled as follows:—wall-plates  $4\frac{1}{2} \times 4\frac{1}{2}$ ; tie-beams  $9 \times 4$ ; principal rafters  $7 \times 4$ ; pole plates and purlins  $7 \times 4$ ; common rafters  $4 \times 2$ ; queen and king post in the clear  $4 \times 4$ ; braces or struts  $4 \times 3$ ; battens for slates  $2 \times \frac{3}{4}$ . The roof is framed in the manner represented by the Illustration (Plate 30).

**§ 467. Roof should project beyond Walls.**

To protect the walls from wet, the roof should always be extended beyond; the tie-beam being long enough to run over the wall and receive the common rafters. The gutter will then be clear of the wall, and will be supported by the rafters and by cantilevers and brackets on which the cornice would be formed, or the construction left to show, according to the design adopted.

**§ 468. Let Gutters and Pipes be plentiful.**

The gutters and rain-water heads should be large, and it is well to have the leaders or upright pipes sufficiently numerous to carry off the water from as short a length of gutter as possible. The expense of an additional leader on the side of a house is not great, and will be a safeguard in case of any stoppage or accidental overflow. The appearance of the rain-water pipes is often unsightly, but when so, it is because they appear to have been an after-thought,

and have not been placed with any intentional or symmetrical design. A recess in the wall is only to be permitted when the wall has such a thickness as to allow so much to be taken out of it; but in fact there is no reason why the leaders should not be honestly left to plead their presence as necessary and important appliances of a building. They will be less conspicuous if painted the same colour as the general tint of the walls.

A periodical inspection of the roofs, gutters, and rain-water pipes in early spring and late in the autumn, so that all causes of stoppages from dead leaves, birds' nests, and the like may be removed, will save much outlay and annoyance.

#### § 469. Floors.

A good floor is a luxury, and even in our best houses it is rarely to be found. The old custom prevailing to this day in Holland and in the United States of making the floor of a double thickness of boards is excellent, and might be commonly introduced. The practice is to lay a tight well-fitted floor of sound but not so carefully selected (seconds) boards upon the floor joists, the space between the underside of which and the ceiling having been previously deaened by pugging mortar in the usual way, and then, after the grounds are set, the skirting board fixed, doors and casings hung, and all the plastering completely finished, the top floor is laid. This should be in uniform widths, narrow, and well seasoned, and secret nailed, that is, with nails driven diagonally into the edges of each floor-board so that the heads do not show. By this means the surface of the floor is clean and smooth, uninjured by the workmen treading in the coarse mortar and other loose rubbish that unavoidably accumulates in finishing an interior, and remains firm and with close joints. All laying of gas-pipes and the like should be seen to before the upper

floor is fitted ; but for removal in case of repairs a marked board can be laid, and this and the under length be put in with screws so as readily to be taken up in case of necessity.

Felt is used as a means of deadening the transmission of sound, and is much lighter than the filling in of mortar ; it has been recommended as a means of supplying the omission of pugging in old work ; but, for new, its enduring qualities remain to be tested, and if they are found satisfactory, it will be an important addition to the materials for increasing the comforts of a dwelling.

#### § 470. Windows, Casements, Sash Cords and Weights.

The ordinary lifting sash, double hung, is perhaps the best mode of opening and closing a window. French casements, whether opening within or without, are inconvenient : when opening *inwardly*, they disturb the arrangement of blinds and curtains, and require very deep internal reveals ; and when opening outwardly, they are dangerous (as witness the recent accident at Buckingham Palace), unless on a level with an external floor, and then they are awkward to control in windy weather, and their projection is much in the way.

Many patents have been obtained for dispensing with weights and sash-cords in hanging the sashes, but no mechanism that has been suggested, is really so decidedly preferable *under all circumstances* as to take their place.

The introduction of cheap cast-iron weights has caused the objection to double-hung sashes, that they are often too long, are badly attached to the sash-cord, stick in the slide, and so become a nuisance. The employment, too, of

plate glass, with its greatly increased weight has added to the difficulty, but with honest workmanship, and stout fittings, good flexible sash-cord (patent wire rope by preference) there is nothing to object to in the prevailing use of the pulley and sash weight.

Large sheets of plate glass undoubtedly create a difficulty in making the sash that contains them easily workable. It would seem that the true mode should be to divide the large window into three portions; the central wide and fixed, and the sides only to rise at top and bottom. If more air is needed than these spaces will afford, the upper sash should contain a glass ventilator of turning slats, than which nothing can be more effective in action, and unobtrusive in appearance.

#### § 472. Bay Windows.

*Bay windows* are in universal fashion; they require good workmanship; as to roof, so that the line of junction with the wall may not leak, and the rain spoil the ceiling; as to fitting of sashes and frames, so that persons sitting in them may not be exposed to draughts; and as to the planning and putting up of blinds, curtains, and shutters.

#### § 473. Ceiling should extend into the Bay.

It is always desirable to let the ceiling run into the bay as by that means the apparent space is increased, but this effect is lost when the curtain and its cornice extend across the front of the bay. A satisfactory plan is to let the curtain be so arranged as to hang in the reveal, and to place the cornice as flat as possible against the cornice of the room. To do this properly the curtain should not be of too thick a material, nor should there be much upholstery at the head.

**§ 474. Blinds best suited to Bay Windows.**

Blinds are the appropriate covering for the inside of bay windows, at all events, the curtain need not extend beyond the sides. Upholsterers always find a difficulty, and it is not often that a room is happily managed in this respect; as a nook for pleasant sitting in, the bay should be as free from drapery as possible, and heavy curtains, however well drawn back, are greatly in the way; at night when they are drawn, the objection is less, but it is not at that time that the bay is likely to be so much in request. Blinds therefore are recommended; a venetian blind against the glass of the very best construction, (the patent metallic blind for instance,) and an inner one of silk or other coloured material of tint and design harmonizing with the general finish of the room.

**§ 475. Rectangular Bay Window.**

A shallow rectangular bay with narrow side lights is often agreeable in certain aspects; a projection with lights *only* at the side, and the centre filled with a large mirror or picture, or panelled decoration, is also at times desirable, and in these cases narrow curtains plainly drawn against the outside corner of the reveal are suitable. Examples of such windows are given in more than one of the plans.

**§ 476. Outside Blinds.**

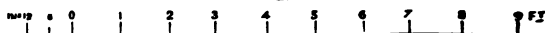
Folding canvas screens and blinds are made in great varieties; of these the *Heliöscene*, as it is called, is the best, but it is expensive. A sliding blind running upon wheels over a metal or hard-wood fillet is often very useful. For country dwellings it is peculiarly appropriate and is inexpensive and easily managed. A sketch is given of



a window so arranged with the sliding blinds pushed back



*Sliding External  
Window Blind.*



No. 31.

the mode of applying them will be readily seen in the above Illustration 31.

#### § 477. Inside Blinds.

The rolling metal, or wooden, blind forming also protection equal to the ordinary inside shutter, is in frequent use and does not need description. When applied, good workmen accustomed to the invention should be employed or the gearing will not work well.

A very light and useful substitute for the ordinary wooden blind is now manufactured in pliant corrugated iron, no thicker than ordinary note paper, but very strong by reason of the edges being turned over. When drawn up the blind occupies so small a space as not to obtrude upon the economy of the window frame and sash opening. It is enamelled in many plain colours and can be obtained with ornamentation and being pliant and the coloured surface of an elastic

nature it does not crack and requires only washing to clean.\*

**§ 478. Locks, Fastenings, and Ironmongery.**

A cheaply built house always fails in locks and fastenings. There are qualities made especially for scamping builders which do not find their place in retail shops for ordinary customers. It is impossible to specify every item to which attention should be called, but in building a house the simple and safe rule is to require a sample of each article of iron or other metal fitting to be submitted for approval and to test it before sanctioning its use.

In buying or leasing a dwelling, the "first loss is the best," and for the rooms in most frequent use, if the locks, handles, and fittings are hopelessly bad, better to replace them at once with articles of better quality, than to commence with repairs that will generally end in a larger outlay spread over irregular intervals than would have sufficed for new.

Loose door knobs are a prevailing nuisance in cheaply finished houses; the clumsy ineffective spindle with its little screws through the shank of the handle, and uncertain arrangements of sinking in the bar is intolerable, and only proves how dearly our workmen love an old way and how obstinately they fight against any thing new and better.

**§ 479. Patent Collars and Door Knobs.**

The best door knob is one with a moveable collar round the shank of the handle, attached by screws to the face of the door, the other end of the knob going through with the

\* The blind is called the "*Patent Metallic Window Blind*," and is manufactured by the Patentees, Messrs. Hodkinson and Clarke, Canada Works, Birmingham.

lock and permanently fastened thereto. This mode of affixing the handles is so simple and obvious it is a pity a plan was ever allowed to be subject to a Patent which retards its use.

In general earthenware or china knobs and handles do not answer, being liable to break on any slight concussion.

## CHAPTER XI.

### PLUMBING AND WATER SERVICE—GAS LIGHTING —WARMING AND VENTILATION.

#### § 485. Causes of Failure in Plumbing.

THE general defects in plumbing are as follows; first that the material, lead, has been too sparingly used; hence pipes are frequently too small in the bore and of insufficient weight. Next, they are insufficiently fastened; hence their weight drags them down, gradually breaking away the joints and thus causes leakage.

They are out of sight; hence indifferent workmanship is tolerated because not seen; but a far greater evil results. Being out of sight they cannot be got at for repairs without disturbance of carpenter's or plasterer's work (frequently expensively finished); they are also generally attached to an external wall, and hence liable to injury by frost.

#### § 486. Lead Pipes unsatisfactory.

*Lead pipes* are generally employed for water service as being more manageable as to fitting and as to repair, but the question as to their healthful employment has by no means a satisfactory answer. Galvanized iron, even glass and porcelain pipes, or metal lined with tin have been employed with results more or less satisfactory, but their rigidity is a serious practical difficulty which can only be surmounted by special arrangement of the entire water service to favour their application.

For water used for drinking and for culinary purposes there can be no question that the less time it is retained in lead pipes the better; hence the practical rule is, let the supply cistern be of slate or cement, and let the tap for domestic use be in it, or rather in the filter immediately attached to it, or, if a pipe be requisite, let it be of zinc, galvanized iron, or enamel.

**§ 487. Boiler Pipe attached to Filter.**

The service pipe connected with the range or boiler should be supplied from the filter and may be of iron, conducted in the most direct manner possible with the fewest turns and angles that can be employed. These and indeed all iron pipes used for the transmission of water for domestic use should be well washed out internally and when fixed the water should be allowed to run through them under as great a pressure as is available before attaching them to the boiler, so as to drive out as much of the oxide as is capable of being detached from the inside.

**§ 488. Easy Access to Pipes—Security from Frost.**

But above all let it be insisted on that all pipes, water or gas, be in sight or where they can be readily got at. They need never be unsightly, and the fact that they are exposed to view will compel the choice of better materials and superior workmanship.

All pipes should be mounted on narrow wooden strips placed against the walls, and when necessity compels the placing of them against external walls, there should be a double thickness of felt between. When placed in an angle, the board should stand across the angle so as to enclose a stratum of confined air and reduce the danger of frost striking through.

The hold-fasts, sockets, and other fastenings of metal pipes should be stout, neatly finished, and fastened to the

strips by screws. To preserve a cleanly appearance of the pipes, black lead applied in the ordinary manner (as to grates) is better than painting.

**§ 489. Valves to Water-closet Cisterns.**

The valve in the bottom of a cistern is constantly liable to derangement, especially when exposed to external air. It is better to omit it in such a situation, and to attach an open service pipe with such an apparatus for flushing the pan as does not need the plug valve in the cistern. Several well-known pan actions effect this—*Underhill's*, for instance, as also *Jennings's* and others.

**§ 490. Zinc Cisterns.**

When *zinc* is used for lining a cistern no lead work should be permitted to be attached to it, or a galvanic action will ensue, which will infallibly destroy the joint.

**§ 492. Housemaid's Closet.**

The *housemaid's closet* should be lined with slate or porcelain tiles, and furnished with an earthenware sink in preference to metal. A bottle of (diluted)\* Cond's Fluid should always be kept in use, and should have a small ledge or shelf for its special stowage. The sink should not be enclosed underneath, indeed wood-work of any kind should be rejected. An earthen pan with a drain-pipe opening over the trap, should be placed above the sink; this should have an enamelled iron cover, and is intended for the reception of the cloth and the like in use for cleansing purposes. An external window, however small, or some ready mode of ventilation is desirable.

**§ 493. Let Waste-pipes from Sinks be large.**

The waste pipes from all sinks, and especially from

those in the scullery or kitchen, should be of large size trapped at the bottom, and with bell-traps under the sink. The latter should be large and strong, and the upper portion should be a fixture, so arranged that only a workman could remove it for any necessary repair. Servants *will* leave the covers off these traps, and consequently there is an insidious escape of poisonous gas. A stone sink will stand rough usage better than one of any other material, although enamelled iron is more cleanly.

For healthful use of all water-closets and sinks, copious and frequent flushing of water is absolutely essential: attention should be paid to this by some reliable member of the household, and advantage may be taken of the time when the water is coming in (under the intermittent supply system at present prevailing) to open the taps and lift the valves of closets, so as to permit a good flow through the house drains.

#### § 494. Clean out Cisterns often.

Metal-lined cisterns inside a house should be frequently cleansed, for the deposit from all water has an injurious effect. The standing pipe, which serves as an overflow and by removal permits the water to discharge itself, is liable to leakage at the socket; a separate cock and pipe, with a small overflow inserted into it below the tap, is a more certain arrangement.

The tops of all internal cisterns should be protected by wire netting, to prevent rats or mice falling in and poisoning the water, as has been before remarked.

When slate is used for such cisterns (and it is the cleanest and most wholesome material) there should be as few openings in it as possible. One, in fact, at the bottom, carried through, and extending an inch or two inches, so as to allow the sediment to settle, and not to enter the pipe, and one or overflow at the top, are sufficient, as the necessary

connections can be made from the pipe inserted at the bottom. All taps and bib-cocks should be of full size: small ones are more difficult to keep tight, and become soon worn: well made fittings of this kind are necessary to prevent leakage and secure effective working.

#### § 498. *Water Service.*

In arranging a system of water service the following points should be seen to :—

All pipes should be self-emptying ; that is, when shut off from the source of supply, and a tap opened at the lowest point, all the contents should escape.

In cold weather the pipes leading to points most exposed should be capable of being shut off and emptied, so that in case of accident by frost, the supply may not be drawn off by the leak.

In the lower cistern for domestic use, a tap leading direct from the service pipe, with a stop-cock below it, will be found useful. The water can be shut off by the stop-cock from running into any pipes injured by an accident, whilst water can be drawn to fill the boiler and for other useful purposes, until the necessary repairs have been made.

It is a common mistake in carelessly arranged plumbing work, to have all the pipes leading one from the other in such a manner as that a leak in one affects the rest, which causes much inconvenience if an accident occurs.

The simplest arrangement is the best, however, for servants are not at all good machinists, and the less that is left to their control the better; only the means of shutting off exposed points, the safety-cock to retain the supply in the cistern when a defect arises in any pipe, with the service tap available at all times direct from the cistern, should always be provided.



### § 501. Gas Lighting.

All the pipes should be laid where they can be readily got at, and the joints should be carefully and thoroughly proved.

No soft metal pipes should be permitted. These are often introduced as an afterthought to supply some burner not originally provided for, and are causes of danger. They are frequently carried on the outside of a wall, often from the floor, where they are constantly exposed to injury, such as the driving in of a nail in fastening a carpet, a blow from furniture and the like.

The gas meter should be placed where it can be readily got at, and yet sufficiently out of reach to secure that it is not meddled with, and should be protected from the cold. A regulator in connection with it, set to a pressure equivalent to the expected consumption in the house, is always recommended, and will prove a great economy. By using this the pressure is always equable and low, so that the whole of the gas is consumed, and waste by carelessness of servants in permitting the taps to the burners to be always "full on" is impossible, as no more gas is supplied to the pipe than the regulator is "set" for.

With a regulator, the larger the burner the greater the amount of light, the consumption of gas being no more. A six-foot burner will yield twice the amount of light, under the same pressure, as a three-foot, and use no more gas; this is an important fact, proved by experiment but not generally acted upon.

The action of the regulator is calculated to permit a uniform pressure at each burner, and under all circumstances, for as the Gas Companies deliver the gas at high pressure in order to meet a variable demand, the pressure upon the pipes within the house cannot be uniform, so waste and imperfect combustion ensue. The first instrument invented to remedy this, was called the "Governor,"

and was a contrivance originating with the late Mr. Clegg, C.E., but it was bulky and expensive, and owing to these and other defects was but little in use.

The regulator in general use is the one known as *Strode's Regulator*; it is small and compact, uses mercury instead of water as in the before-named apparatus, and when once adjusted requires no further care.

The cost is claimed to be saved by the quantity of gas reduced in consumption during one winter's use. The price of the instrument is regulated by the size of the service-pipe attached to the meter; for a one-inch pipe sufficient for 10 lights, the cost is £2 10s., which would be about the staple for an ordinary dwelling of moderate size.

The *Gas Meter* should be selected with care; the wet meter is liable to frequent derangement in frosty weather, as well as to injury from neglect in due attention to filling.

A meter to be useful should measure accurately and register reliably; once adjusted it should not require proving again for years. The flow from it should be steady, without jumping of the lights or sudden fall.

A dry meter is the best as regards accurate measurement and steady pressure, and of the various machines in the market, that known as *Glover & Co.'s* is most favourably regarded. Before the meter is placed it must be proved by the proper officer, and bear the government stamp duly setting forth its accuracy.

#### § 502. Waste of Light.

A great waste of light is caused by the thickness and opacity of the shades in common use. The flame may be rendered softer to the eye, but the number of burners necessary to yield sufficient illuminating power under such unfavourable circumstances, greatly raises the temperature of the room and vitiates a larger amount of atmosphere. Clear glass globes are certainly the most economical and cool.

In order to throw light upon a table, as in the dining room, library, or family sitting-room, opaque glass shades of a conical form with wide openings at bottom, so as to deflect the rays, are useful.

A common fault in the shape of our glass globes must be noticed. When of English make they are invariably flat at the poles, whereas foreign glass-workers contrive to make them truly spherical, and consequently far more graceful.

#### § 503. Heat of Gas: Sun-burners.

The great heat and the vitiation of the atmosphere caused by combustion of gas, are evils which many appliances have been introduced to overcome. Of these the *sun-burner* is the most successful. This machine not only yields an abundant light, but carries off the products of its own combustion, and with them the heated air of the room in which it is placed.

As at first manufactured the sun-burner was clumsy and unsightly, but by great improvements it has become graceful, healthful, and thoroughly efficient.

Its leading principle is the confining the burners in a transparent case more or less ornamental, and leading from the top a metal-pipe to carry off the heat and offensive air arising from the burning of the gas, in doing which a powerful outflow is established from the top of the room by which the hot foul air is drawn off and a means of ventilation is secured.

To fit the sun-burner to houses already built frequently entails considerable expense in providing the outlet for the heated air; but, in building a new house, a spare flue constructed in the chimney will be found sufficient.

#### § 504. Gas Heating and Cooking.

Gas is employed for heating purposes in various ways, and

often with economy and convenience. For occasional cooking, a small apparatus is economical and serviceable, and for the nursery, or for use at night, or for an invalid, is exceedingly convenient. In the dressing-room or the family chambers, a bracket with kettle and small saucepan is often useful, and a comfort in many an emergency.

For general cooking purposes, there is scarcely any reason to employ gas as a substitute for ordinary fuel, although such a system has its advocates, but for heating water for bathing-rooms no more economical and easily managed agent can be resorted to.

For warming dressing-rooms, passages, and exposed portions of a house under occasional circumstances, *gas-stoves* are useful; they should, however, always have a pipe leading into a smoke flue.

### § 506. *Warming.*

Artificial modes of warming buildings are not as much in vogue in England as in other countries, and even when employed, can never supersede the open cheerful fire-place.

No systems in use are unattended with trouble, and all are expensive both in first application and in maintenance.

The coil of hot-water pipes at a low pressure is the system most in favour in this country; it can be used two ways, either to warm an air-chamber into which the external atmosphere is drawn in, and, after becoming warmed by contact with the pipes, is conducted through openings into the several rooms; or the pipes themselves are disposed about the inner sides of the room and warm the air of the apartment. The former plan affords a better ventilation, because a free supply of fresh air is admitted into the interior of the building, but it is not so effective as a means of obtaining a great degree of heat as the latter system.

**§ 507. Hot-air Furnaces.**

*Hot-air furnaces*, by which the air brought from outside is warmed by contact with heated metal or tile surfaces, and then is conducted into the rooms and passages, present the readiest mode of obtaining a high temperature. There are, however, many drawbacks to the use of such apparatus, principally from the excessive dryness of the air, and from the danger of escape of sulphureous gases and dust into the air-ducts. But these defects can be remedied; the former by freely evaporating water in the hot-air chamber, and the latter by more careful construction and by perfect fitting of all joints. In all cases a hot-air furnace should be of *wrought iron*, not *cast*.

**§ 508. Steam Pipes for Warming.**

*Steam* is also used, either in coils of pipes for heating an air-chamber; by circulation; or grouped in each apartment in an ornamental casing. Excepting upon a large scale, and under very intelligent control, it is not to be recommended for domestic purposes.

**§ 509. Hall should be Warmed.**

The *halls* of all houses excepting of the smallest size should be well warmed; some use should be made of the large amount of waste heat that escapes from the kitchen chimney flue, and it is remarkable that no well-contrived simple apparatus has before this been manufactured to utilize the waste heat and convey it to the hall in winter time. As the kitchen and hall are often upon different levels, the employment of such a scheme seems the more feasible.

Hot-water pipes attached to the saddle back of an ordinary range have been employed to warm an upper room or hall, but not successfully; a better plan is to leave an

air-chamber of tile and fire-proof cement in building the kitchen chimney, and this with an air-pipe leading to the exterior, and a flue conducting to the hall, will convey warmed air from without, without incurring any danger of carrying in the odours of cooking, and at very small expense.

#### § 510. Air-pipes to Fire-places.

In building a new house, all fire-places should have a pipe communicating with the exterior built in the walls and opening at the back of the stove; by adopting this plan, and by using stoves with an air-chamber and *grille* openings in the front, steady streams of pure warm air would come out into the rooms and greatly assist their healthful ventilation.

Frequently an obstinately smoky chimney is cured by introducing such an air-pipe, which supplies the fresh air needed for combustion, and sets up a sharp draught to the flue.

#### § 511. Ventilation.

Elaborate appliances for the ventilation of houses are entirely useless for an architect to recommend. However beautiful in theory and however true to scientific principles, anything requiring delicate adjustment and intelligent control proves in practice a nuisance, and is soon abandoned. In how many houses "ventilated" according to the most approved modern ideas, are the openings papered over that have cost so much money to fit up? There is yet a general need of—not a *better* system of ventilation, for there is really none at all—but an intelligent comprehension that pure air must be brought into an apartment and bad air taken out, and every architect should in constructing a house provide that this is done.

It is his own fault if it is not; there is no necessity to

trouble the client or to go to great expense, but a careful attention to this sadly neglected but most essential part of house building is as due to the owner as that the drains and water service are properly contrived.

The truth is, that ventilation is rarely thought of until the building approaches completion, when costly contrivances are resorted to, to accomplish what should have been provided at first.

Such refinements as air passing through screens, and admitted through "imperceptible apertures," or made to linger amongst blocks of ice so as to cool it, are not suggested, but attention to a few simple rules is insisted on.

#### § 512. A simple Plan of Ventilation.

In the first place, in all rooms the chimney and fire-place are the great centres of ventilation ; the fire would always carry off heated air, were its position not so low ; recognizing this, the Arnott's valve inserted in the chimney at a point near the ceiling is itself well enough, but is too small an opening to really change the atmospheric condition of the room. But the fact remains that the fire-place, if fairly well constructed, does draw off much of the foul, and admits fresh and warmed air to circulate in the room.

This being so, an obvious plan occurs ; namely, in building all chimney-stacks, *invariably* provide by the side of the smoke-flue an air-flue to every room. With an aperture into the air-flue, the hot air rising towards the ceiling has the means of escape, whilst the more ponderous gas nearer the floor will be drawn into the fire.

Still further to assist the withdrawal of the hot air from the top of the room, *a communication should be left from the ceiling to the flue of the fire-place in the room over ;* this will be found invaluable in working, even if there be no fire in the room above. For use on exceptional occasions (a large

party, for instance) an aperture through the ceiling of the lower room into the floor near the fireplace of the room above, with a tin or light wooden cover so shaped as to direct the draught towards the opening in the fireplace, will be found a cheap and expeditious expedient.

The air-pipe discharging fresh external air beside the fireplace, and the up draught into the flues at the side of the smoke-flues, will suffice *ordinarily* to keep up a steady circulation of air without draughts in each room.

#### § 513. Internal Circulation without Draught.

The hall and principal staircase should be considered as the great air reservoir of a dwelling, and should supply warmed fresh air whenever a door is open; not only this, there should at all times be a steady intercommunication kept up of the air in every room with the hall.

To do this, apertures immediately under the ceiling should be left through all inner walls that surround the hall or passages communicating with the staircase. These apertures should be 12 inches to 15 inches long and  $2\frac{1}{2}$  inches high, and they should be provided with a flap or slide to close the opening if required. There should never be less than two to each room of moderate size, and as many more as the disposition of the walls around the stairway will permit.

#### § 514. Air must be brought into Rooms.

It is to be remembered that although the difficulty that all attempts at ventilation have to encounter is that of sucking air *from* a room, it is at times equally important that air should be admitted *into* the room other than by doors and windows. The apertures at the top of inner walls will be found in practice to work both ways, serving at one point to let the hot air escape, and at another the air from the hall



into the corner afforded by the projection of the kitchen wall.

In front of the drawing-room is a verandah. This plan gives somewhat more of seclusion to the apartments occupied by the family, but, on the other hand, the side entrance involves the separation of the private room from the library, an arrangement, however, which finds favour with many clerical householders whose opinion has been sought upon the respective plans.

The amount of bed-room accommodation in each example would be about the same. The cost of erection would be from £1700 to £2000.

#### § 340. Attributes of Country Parsonage.

The *country parsonage* should not be too large or pretentious. The cost of repair and maintenance sometimes falls heavily on a family, especially when bereft by death of the means of official support, and a large claim for dilapidations is made by the successor. It is sometimes a cruel thing for an incumbent with large private means to indulge his own elegant taste, and leave to his successors a residence far beyond the income of the living; not but that a good house is always a welcome boon as a part of clerical preferment, yet there may be "too much of a good thing," and crippled means, and then a neglected, dilapidated building, are the results. The house above all things should be substantially built, the walls solid and of good materials, the roofs well timbered and stoutly framed, and the covering as durably laid as can be. All of these are matters of greater importance than correct architectural expression, if professional aid is not called in; but perhaps no building ever erected requires more completely the skill and direction of an architect than the country residence of the clergy.

to enter, therefore there should be several openings rather than one, and if the hall is properly warmed with an efficient flow of air through it, the contents of the rooms must inter-communicate through these openings and a healthful circulation will be obtained.

In all bed-rooms such openings are absolutely necessary, and should never be omitted; being placed so near to the ceiling that neither light nor sound can pass through them.

#### § 515. How to utilise Hall and Stairway for Air.

To make the staircase and hall the ready means of obtaining a supply of pure air for the rooms, temperately warmed in winter and cool in summer, there must first of all be a fireplace or artificial heat, there then must be a means of escape for heated air at the top, and a supply of fresh air in regulated quantities from without.

If the hall is in the centre of the house, without external windows, and obtains light only from a skylight in the roof, apertures to open and shut must be made in the frame; but a better plan will be to construct an air-flue of the same dimensions as the smoke-flue next thereto in the chimney shaft, with gratings at various heights.

The throat and fireplace opening of the hall should be wide; if a stove is preferred to an open fire, the pipe should be carried by an elbow several feet up the flue with an open space around for suction of the air from the front, or otherwise there will be no ventilation at the most practicable point.

#### § 516. Ventilation of Water-closets.

All water-closets should have an escape-pipe connected with the soil-pipe, as has been before insisted upon, and if an external window near to the pan cannot be obtained, there should be communication with the external air by a slide or other opening just above the seat. If by necessity

the closet is placed where it cannot communicate directly with the open air, a flue must be constructed leading to the nearest chimney-shaft and carried up above the roof.

It must, however, be borne in mind, that air-flues will be of little use unless carried up alongside of a heated smoke-flue.

#### § 517. Prevention of Down Draught.

For the prevention of down draught from the top of escape-flues various contrivances have been suggested. The turning cowl is generally efficacious, but sometimes interferes with other openings; where it can be used, its power will be considerably increased by placing a funnel in the back opposite to the mouth, the compressed wind rushing through will cause a vacuum, and assist in giving egress to the column of air within the pipe or flue.

The truncated cone with disc supported upon rods, which is in such general use in some parts of America (Boston school houses especially), is usually very serviceable to cause an up draught. It is known as "*Emerson's Ventilator*," and can be readily made by any ordinary workman.

Since its first introduction, some twenty years ago, a diaphragm division has been placed in the shaft, which aids its action very materially.

The top of the flue opens into a box which forms the base of the cap, upon this is placed an upright cylinder of any height not less than three times its diameter, surmounted by a conical covering open across the top, but filled in at the bottom; above this, at a height equal to a diameter, is a metal disc of the same size as the bottom of the cone, this is carried upon metal rods and is to prevent rain or down-draught penetrating to the tube. Within this is a cylinder of smaller diameter extending into the flue, the sides of the box or base being carried down to the top of the flue and filled in around the bottom.

**§ 518. Emerson's Ventilator for Ceiling.**

Where this machine is used without a flue, for the ventilation of a ceiling, the pipe should be carried down a little below the ceiling and terminate with a funnel-shaped mouth; the outer casing of the box or base also should be continued to the ceiling, and left open with a grating or other ornamental series of apertures around it.

**§ 519. Its Action.**

The action is obvious, but excepting there is a current of air blowing across the top the upward draught is very slight; it is, however, very rarely indeed that at the usual altitude of a roof there is not a sufficient movement of the wind to displace the air around the cone, and this causing a partial vacuum upon the other side produces an overflow and consequent rush of air from below to supply its place. The action thus set up being continual, an upward escape of air, more or less rapid, is ensured within the flue. The division by the inner tube or diaphragm undoubtedly aids as a remedy for the force of any down draught, which this contrivance seems to avoid better than any others in use.

**§ 520. Air-flues for Sun-burners.**

The air-flue to every room, formed in building the chimney, affords a ready means of adjusting the apparatus of the *sun-burner*, the principal expense of fitting which is generally due to the necessity for reconstructing the chimney. In connection with such a flue the sun-burner supplies the most effectual escape for the heated air in an apartment, and becomes a perfect ventilator.

## CHAPTER XII.

### PAINTING, INTERNAL DECORATION, AND FURNITURE.

#### § 525. *Tasteful Colour gives Cheerfulness.*

THE interior of a dwelling derives much of its pleasantness of aspect from the cheerful and tasteful colouring employed on the walls, ceilings, and woodwork.

In the last few years, indeed notably since the Great Exhibitions, there have been great improvements in articles used for decoration of rooms, both expensive and cheap. Architects have been encouraged to supply designs for paper-hangings, and, on the whole, the warerooms of our large manufacturers offer an ample supply for selection of tasteful and effective patterns.

Cheapness has spoilt in these, as in other manufactures, much that might have been satisfactory, and has produced papers and colours neither durable nor adapted to the purpose they should fulfil; the economy, therefore, has been of the wrong kind. Painting, beyond any other process, requires good materials as well as workmanship.

Cheap machine-made papers quickly lose their colour, and as the process of manufacture does not permit of their being properly "set," the tints rub off and the pattern fades.

**§ 526. Four Coats to all painted Woodwork.**

All woodwork should be well painted with four good coats of white lead and linseed oil; for internal work "flatting" (as the dead finish of paint is called) requires spirits of turpentine, but for external work the addition of turpentine should be sparingly permitted, on account of its affinity to water, which causes the paint to flake off, and is not durable.

The introduction of mineral oils and spirits has led to adulteration of turpentine, which is a vegetable product. A test of purity is found in the fact that vegetable turpentine when exposed in a vessel to the air loses in bulk, but by absorbing oxygen from the atmosphere gains in weight. The contrary is the effect of similar exposure of the mineral fluids used as a cheap substitute.

**§ 527. Kinds of Paint recommended.**

For all delicate colours *old* white lead should be insisted upon, as the yellow tinge found in all pure white lead when ground with linseed oil is only lost by time.

The adulterations of linseed oil and white lead are so excessive, that there is no other security than dealing with well-known and respectable firms, tenders from whom for work will always be found more economical in the lapse of a few years than the cheaper prices submitted by those who never expect to be applied to again.

*Zinc* forms a perfectly pure metallic paint of exceeding whiteness. Its use, too, is not attended with the same deleterious results as white lead. On account of its thinness, however, which causes it to require additional coats to obtain the requisite body, it is not as general a favourite as, if better known, it would be. One great advantage possessed by zinc paint is its exceeding durability: after five or six years of repeated washing the tint will be found as pure and delicate as when first laid on.

In America it is largely used ; it is manufactured by a patent process, by which greater body is obtained, a smaller quantity of oil is ground up with it, and it requires less subsequent dilution.

#### § 528. Practice of Clear-coleing.

A cheap substitute for a coat of good oil paint is often recommended by painters, which is called *clear-coleing*, and which is nothing but white lead (often mixed with worthless powders,) ground in water and thinned with size.

For new work this is absolutely valueless, but sometimes it can be employed with advantage as a first coat over old and dirty paint to give a cleaner surface for subsequent painting. Under any circumstances it should never be used for carvings or enrichments, or all sharpness and delicate sinkings will be lost.

#### § 529. Graining and Marbling.

*Graining* and similar processes in imitation of other materials are more durable than ordinary painting, principally because more coats of paint are carefully laid on, and because they are well varnished, or otherwise surface hardened. As a matter of taste the exaggerated imitation of curled graining and impossible knots cannot be extolled, and the present feeling seems to be against it, so that "combing," as the finish given by a coarse flat bristle or leather brush is called, is more in favour. The best graining is done upon thick coats of paint, as a ground for the process of "combing."

#### § 530. Water-graining.

Although graining is generally done in oil-colours, "water graining" is more delicate and brilliant, and more nearly approaches the texture of the original woods. This consists

of graining upon the wood itself, which is first prepared with a coat of size. The natural grain of the wood appears, and is heightened by dexterous use of the combing tool. When well varnished and rubbed down, the work is soft and natural in appearance, as well as to the touch, and is quite durable. Seasoned wood-work is necessary for "water-graining," as the surfaces must be left clean and free from filling up putty and the like.

### § 535. Paper-hangings.

For wall decorations, papers are cheaper than painting, even if the surfaces are but little varied in tint. A comparatively new material has been introduced, which offers great variety of treatment.

This is the relief paper, in which flock or cork powder is used for producing raised or sunk surfaces of various degrees of thickness, varying from one layer to five, or even more. The paper itself does not differ from the flocks in general use before, but the novelty consists in hanging pieces plain on the walls, and colouring them afterwards, by which means the joints are covered, and the surface appears even, as precisely as if stamped and painted.

A coat of glue size is first given to the flock, which collects the grain together and hardens it, then the whole is painted in oil or distemper, according to the outlay desired, and various tints are introduced and designs pencilled in, as much more or less decoration is intended.

The durability of an oil-painted paper of this description is beyond that of any other surface or material; it can be cleaned and repainted as long as the fabric of the wall itself lasts.

Ceiling decorations are also manufactured in the same material; in the hands of intelligent workmen satisfactory results can be obtained at comparatively little cost.



Blocks for such papers, designed by some of our best decorative artists and architects, as Pugin, West, Roberts, &c., &c., are used by the principal paper manufacturers, many of whom carry out the designs of the architect for interior decorations with great skill and taste.

**§ 536. Let Decoration suit use of Room.**

In choosing the tint of a paper, and in arranging the subdivisions of the surface when the room is intended to be decorated, its use must of course be the primary consideration. The furniture must be kept in view; and in a dining-room or library so much of the wall space will be covered by it, that the disposition of the decorations should be made subservient to the placing of the separate pieces.

**§ 537. Pictures part of Decoration.**

The same of pictures; these should be considered part of the decorations of the room, and should be arranged for upon the walls; the subdivisions by positive members or by changes of colours should be disposed accordingly. In connection with them, the subject of picture-frames naturally occurs, and is important and unsettled. When possible, a recess in the panel of the wall, specially formed to receive each important picture, is a pleasing arrangement; then the frame should consist of gilt enrichment, harmonizing with or forming part of the rest of the embellishment of the wall. So of mirrors, and the same of recesses or panels behind pieces of sculpture. But as the acquirement of pictures is often gradual, and their precise size or nature cannot always be determined beforehand, a simpler system of decoration is at times necessary. The whole question as to legitimate treatment of paintings hung upon walls seems to turn upon this, whether to make each picture a decorative portion of the design, or to keep the colouring of the wall subordinate to the pictures.

The rules to be insisted upon then become simple; in the one case make each painting the central point of each decorative subdivision, in the other keep the whole surface of the wall unobtrusive and subordinate, letting the picture and its frame stand distinct from a background of such neutral or harmonious combination of colours as produce the effect of a plain tint. No small details should be allowed to catch the eye, and withdraw it from the pictures.

Where it can be done, however, the former plan of selecting the pictures in combination with the decorative treatment of the apartment is preferable.

#### § 538. Cement should not be Grained.

When *cement* has been used as a substitute for wood-work for door, window, and base mouldings, in a building, it would seem bad taste to grain in imitation of woods, although frequently done. Imitations of marble are a degree more permissible, but unimitative colours, with any ornamental decoration, would be in truer harmony with honesty of purpose.

As a material for such portions of internal fittings, *cement* is strongly recommended in many cases. For bed-rooms, on sanatory grounds, it certainly is to be preferred to wood-work, and if of properly chosen materials, used by good workmen, it will be tough and durable, receiving paint well, and presenting a better surface than wood.

#### § 539. Decoration of Ceiling.

When ceilings are decorated, thought must be given to their twofold object of effectiveness both by daylight and lamp-light. The introduction of gas-burners or other brilliant artificial lights near a ceiling requires a change in the flat system otherwise effective. For gilding, granulated surfaces

are most effective in such situations ; in fact, reflecting surfaces lose all their brilliancy and beauty in a gas-lighted ceiling. Breaks of surface by bands or other raised and sunk members are necessary for effective display of ceiling decoration over gas-burners, but the carving should be delicate and the tints pure and pearly. Positive colours employed in small portions, and so disposed as to lead away from the overpowering brilliancy of the central prominence to the enrichment of the cornice, cove, and outer portion of the ceiling.

The gas-burner as formerly made cast an ugly shadow upon the ceiling, destructive to all artistic design, but since the many improvements it has received, this defect is removed ; the difficulty that now remains is the dealing with a mass of such brilliancy as a central object, and to harmonize it with the remainder of the decorative work.

The safe rule seems to be to make all light, bright, and cheerful overhead alike ; to treat the brilliant light as a central sun, before whose rays every other glittering tint must pale ; to make the ceiling look high and distant, and brilliant from inherent light, and then, as the surface recedes from the centre, to introduce colour in such delicate lines and gradations that the full richness of the outer work is reached almost imperceptibly.

Positive colours around such a centre only result in greater separation of the feature already so distinct, and necessitate the employment of so rich a key on the whole work, as to endanger its becoming heavy and possibly vulgar, and by daylight sombre and oppressive.

#### § 542. *Hangings and Cornices.*

*Hangings and cornices of curtains* should always form portions of the architectural decoration of the room, and should be prepared for in the design. Nothing can be in worse

taste than the heavy-looking but flimsily-made metal-work at the top of curtains often cutting into the cornice of the rooms, and rarely, if ever, assimilating to it in design.

The cornice or top-finish of a curtain should either be treated as a piece of furniture or it should be a part of the construction of the room ; if the former, it should have visible and recognised support in the way of brackets or pillars of appropriate design ; or, if the latter, the construction should be made an integral portion of the enrichment, as, for instance, the rod upon which the curtains run, or the bar from which the hangings at the top are suspended.

The cheap trumpery of the usual stamped metal-work is bad in the extreme, and often spoils the whole effect of an otherwise well-finished room.

The rich simplicity of natural folds which a good material of itself assumes, is the legitimate result to seek. Let the curtain show its meaning, and how it is attached to the aperture of window or doorway, and let the drapery that in a lofty room is necessary to give grace and finish to the upper part be hung in ample folds, with the rigid straightness of line broken literally by hanging down and natural gathering-up, not by cutting flat surfaces, as if the rich stuff was an inch board, into fantastic shapes, as in the *Lambrequin*—with its hard outlines and unmeaning points.

#### § 543. No Interruption to Ventilation.

All window drapery should be so placed in front of the frame, that the current of air from an upper sash may be directed towards the ceiling ; to do this a space should be left, which modern cornice boxes generally completely fill up, to the destruction of the naturally intended ventilation.

#### § 546. Furniture.

Why the warerooms of upholsterers are so deficient in any-

thing approaching to artistic design is really unintelligible. It costs no more to make a thing pleasing than ugly, but to see the costly and ugly pieces of furniture usually supplied, proves little for our national taste.

At the Great Exhibitions, good designs, executed in admirable taste and skill, were abundant ; but, so far as the general supply for families of moderate means is concerned, there would seem as yet to be but little improvement.

Perhaps the truth is, that most of our dealers are not really manufacturers, excepting in a very casual and unimportant way ; the goods are supplied to them by small piece workers, who as a class are intolerant of changes, and frequently make but the one thing, and in the one pattern.

Those manufacturers who do employ their own men, and see to the making of the articles they sell, should be chosen when furniture is to be selected. Few of them but will readily execute original designs if supplied to them, and will do so at reasonable rates. Several employ skilled artists, to prepare designs and faithfully carry out their details.

In mediæval and Gothic work, more of specially designed house furniture is obtainable than in Italian, which latter is difficult to get in fair expression or good taste. The union of the quaint beauty of good work of the middle ages with the refinement of modern habits, is difficult to manage ; but when seen is truly charming. Dickens happily hits the very centre of aim in such attempts where he describes the costume of Mrs. Maylie, in *Oliver Twist*, Chapter 29. He says the lady was "dressed with the utmost nicety and precision, in a quaint mixture of by-gone costume, with some slight concessions to the prevailing taste, which rather served to point the old style pleasantly than to impair its effect." Equally correct, would this description be of a successful blending of old design with modern use.

Since the Great Exhibitions, a decided improvement is evident in the articles exposed for sale in the warerooms of

the leading manufacturers of furniture ; they are all, however, of so expensive a character, that the man of moderate means is driven to buy the usual inartistic goods in ordinary use. Specially designed furniture, cheap and good, is a thing still to be sought, although a few cabinet-makers profess to supply it. Amongst these Collinson and Lock should be mentioned, because they have sought to produce simple and cheap articles in a better taste, and invited original designs to that end.

#### § 547. Dining-room and Library Furniture.

For dining-room and library, the positive character and intention of the pieces, assists in developing a design which in such articles as sofas, lounging chairs, and ladies' seats is not easy to manage, so as to preserve fidelity to architectural style and comfortable or luxurious use. The introduction of the light, strong, cheap, and tasteful bent wood of Austrian manufacture, has done much to help to fill our houses with improved models of seats, chairs, and tables.

#### § 548. Cretonne as Hangings.

For coverings and for curtains, the most beautiful of materials is fortunately a very cheap one ; nothing can be used so pretty or so rich in effect, as the *Cretonnes* that are now so low in price, and good in quality. With these for all purposes but for dining-room and library chairs and couches which should be leather, the most cheerful effects may be got, and colours can be chosen in endless variety to harmonize with the tint of the decorated walls.

Some of the cotton fabrics of Algerian design and manufacture are very clean and bright, and are well adapted for hangings of a bed-room ; they are cheap, washable, durable, and not so liable to collect and retain impurities as woollen goods.

PART V.  
OUT DOOR ADJUNCTS TO A HOUSE AND  
GROUNDS.

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CHAPTER XIII.

STABLES AND COACH HOUSES, WITH THEIR  
APPURTENANCES.

§ 553. **Stable Building.**

Few houses in suburb or country are considered complete without a stable and carriage house. In town the dearness of land, and restricted limits of the building plots, generally compel the stables to be placed in a mews, but wherever situated, the remarks relating to them would be the same.

The requisites to be obtained in all stables for the health, comfort, and safety of the horse, are, sufficient space, plenty of light, cleanliness, ventilation without draught, well-drained floor, surfaces smooth but without slipperiness to the feet, and avoidance of all hard projections and sharp edges whereby injury may be inflicted.

The horse is a delicate animal, susceptible to cold, particular as to his food, requiring pure air, and a tempered light without exposure to currents or reflected light near his head.

§ 554. **Supply of pure Air without Draught.**

The supply of pure air is the most difficult operation to contrive, apertures that *can* be closed, nearly every groom

will insist upon stopping up, even though the unhealthy steam that rises in the stable shows how vitiated the atmosphere must be.

The usual and bad mode of supplying hay from a loft above, farther adds to the difficulty of surrounding the head and lungs of a horse with cool and pure air, and although so many stable fittings are manufactured and liberally advertised, it is clear that the construction of the stable itself must first be made right, before the desired result can be at all accomplished.

#### § 555. Artificial Impurities.

Most of the impurity of the air is due to the use of absorbent materials in the flooring and walls.

The first necessity, therefore, is to provide materials that are proved by experience to be unexceptionable in these respects, and for flooring nothing is so good as the hard terro-metallic bricks, laid in small squares with corrugated surfaces to prevent danger from slipping. These are glazed and although slightly roughened permit every fluid to run off them and are easily cleaned.

For the walls, hard white gault bricks laid with a close joint in cement and mortar are suitable, whilst painted or varnished boards or glazed tiles are very cleanly for the head of the stall; for the ceiling overhead nothing is better than a double thickness of flooring boards left rough, and lime-whitened twice in every year.

#### § 556. Drainage.

The drainage of a stable must be very thoroughly contrived; each stall or loose box should have a central grating with the floor *slightly* depressed towards it, (nothing is worse for the horse than the now exploded system of raising the head of the stall several inches above the level of the rear) and a leader to the main drain at the end of each.



Some authorities recommend open drains with removable gratings, but greater cleanliness will be obtained by having each leader connected with a barrel drain sunk below the level, and having a rapid fall towards the outlet; this drain should have a grating at the end of the stable for removal of the sweepings, the surface of the floor having a sufficient inclination for that purpose.

By copious use of water drawn from the opposite end and allowed to flow freely towards the outlet whilst the broom is at work, every impurity will be removed and there will be no stagnant accumulations to exhale ammoniacal gases.

Plaster of Paris (*Gypsum*) should be supplied to every stable and its use enjoined. This, well sprinkled on the floor, will neutralize offensive exhalations of ammonia.

#### § 557. Height necessary for Ventilation.

For the ventilation of a stable, height of ceiling is the first essential. Windows at the rear of the horse as many as can be, near to the top and always with the upper sash to fall; the glass may be obscured if the light is excessive, and the frame should be set high from the floor. Gratings for air in the walls just above the floor level are exceedingly useful on the sides and end in rear of the stalls.

Windows at the end, if they can be made in the space for passage and not exposing the head of the horses in each end stall should be provided, but openings over head must be attempted with caution.

#### § 558. Size of Stalls.

The space for each horse should not be less than 5 feet 6 inches to 6 feet in width, by 9 feet 3 inches in depth, the passage being nearly of the same dimension at the rear. The usual custom of placing a horse with his head towards the inner wall requires a width such as is above described, but

where a narrower dimension is compulsory the American plan of turning the head towards the passage, with a swing door in centre and the feeding-troughs on each side may be resorted to with advantage. This will compel the constant use of cut food freshly and frequently brought to him, instead of the plan of a rack with hay above the head, a necessity that many horsekeepers say produces blindness from bringing down the hay-seeds into the horses' eyes.

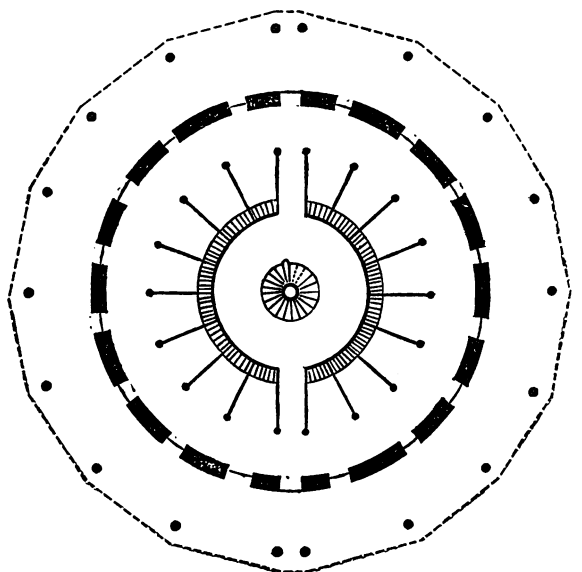
#### § 559. Radiating Stalls.

A plan has occasionally been carried out (in three instances under the personal experience of the author) of a stable with the stalls arranged around a centre ring, within which the grooms fed the horses, approaching them from the head. The grain only was kept within the building, coming down an iron feed-pipe in the centre, the other food being wheeled in from barns outside.

The accompanying sketch of the plan will show the arrangement (cut 32, page 269). Each stall radiates from a centre and affords rather more than the usual space for the horse. Outside the ends of the stalls within the enclosing walls is a passage 10 feet in width, and in each bay of the outer wall is a window reaching close to the ceiling. At the inner end, the space above the manger is fitted with an open metal grating, so that a perfect circulation of air is obtained throughout without draughts. The manger is made to turn upon a pivot and forms also a dwarf door for access for the groom at that point. The water trough is attached in the same way.

Beyond the external wall (which, in actual erection, was polygonal, and formed of straight work, making its construction more easy and economical), the roof is extended down and the plate is carried upon iron posts, affording a convenient exercising circular ride at little cost.

The saddle and harness-rooms, coach-houses and loose boxes in a separate building present nothing unusual in plan in connection with the circular arrangement of the stable, and could be disposed as the site required. In the



No. 32.—Large Circular Stable.

instances referred to, these stables had no lofts above; the roof was ceiled across the tie-beam, running from the outer post to the inner ring, thus enclosing a sufficiency of air space to keep the ceiling cool in the hottest weather. The central ring was carried up to form a granary on the second floor, and contained the feed-shaft before alluded to,

and a light circular stairway. The central portion was finished with a conical roof terminated with a vane.

**§ 561. Underground Stables.**

Underground stables are very objectionable, but are at times not to be avoided, in towns. They can only be made tolerable by good height from floor to ceiling, absolute cleanliness, and by rejection of any material at all porous. An air-shaft, large, perfectly smooth inside, and carried into the outer air above the roof, will assist, and it must be brought down to the floor of the stable as well as opening towards the ceiling. So constructed it will act like a fire-place and flue, and, if provided with such a cap at top as will prevent down draught, and help to establish an upward current, it will draw off the heavy air that collects about the bottom of all such buildings. A jet of gas kept burning within the shaft near the top, has often been resorted to with much advantage.

**§ 562. Bath for Horses.**

In all complete establishments there should be a bath for horses; this may often be conveniently constructed as a washing pit over which carriages could stand when being cleaned. For use as a bath, a pipe connected with a boiler in the cleaning-room or other outbuilding conveniently near, should convey hot water to a series of pipes, with a well-made regulating tap and double junction, to mix with cold and supply the water at a given temperature. These pipes should be perforated, and so disposed about the sides and bottom of the bath as to give a douche consisting of great numbers of minute jets. This system is preferable to the usual tank of heated water, into which the animal is led, and combines the means of gradually filling the bath and keeping the patient in it as long as may be desired. A smaller quantity of water will suffice for a bath thus arranged.

**§ 563. Harness and Saddle-rooms.**

The harness and saddle-rooms should be thoroughly dry ; they should be attached to the carriage-houses rather than to the stables, the moisture and effluvia from which should be rigidly shut out. The floor of these should be of brick, cement, stone, or tile, whilst that of the carriage-houses should be of wood, with hardwood trams for the wheels to run on, sunk one quarter of an inch below the surface.

**§ 564. Doors of Coach-houses.**

The doors of carriage-houses are often ill-contrived. They must necessarily be wide and high, and must open outwards ; frequently, from want of proper contrivance, they are much in the way, the posts and long iron hooks are cumbersome, and the wind tries hinges and bars to a dangerous extent.

Where the wall space on either side will permit, a strong and handy method is to make them to slide in two halves, or, when this cannot be done, to hang them over stout pulleys with wire ropes and sufficient weights, and let them rise in front of the wall overhead.

A still better plan is to fit the openings with iron revolving shutters, and roll them up when required to be open ; in all such cases a smaller door should be provided for the coachman.

**§ 565. Glazed Pipes for Drainage.**

The drainage of all stables and outhouses in which animals are kept should be by means of glazed earthen pipes ; cesspits or any other receptacles should on no account be permitted ; the manure-pit is only allowable where the contents of the stable barrow cannot be removed at once to the garden, and, when made, must be kept clean and covered over. A tank for urine should be sunk in the

ground, built of brickwork and cement, covered tight and with a pump for use. For such a pump the earthen apparatus supplied by Messrs. Doulton for chemical works, would be exceedingly suitable.

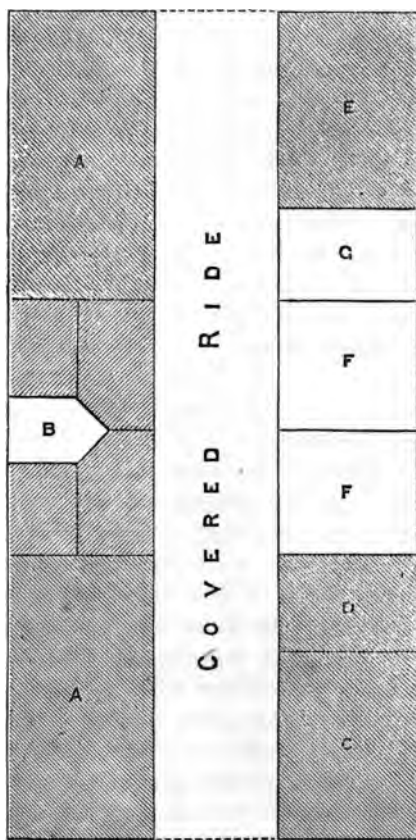
To keep the stable and yard sweet the dryer the manure can be made the better ; therefore no drainage of roof or yard overflow should discharge into the pit, which, with the large quantity of straw that our wasteful English system allows grooms to use, will be but little offensive if not saturated.

The drainage and washings of the stable floor should all be collected into the liquid tank, solid manure only being taken into the pit. When compost is required, the liquid contents can be pumped up or drawn off into closed casks on wheels and conveyed to the proper spot where the mixing process is carried on, but in the stable-yard all such processes, with their accompanying olfactory results, should be excluded and forbidden.

#### § 566. Covered Ride or Grooming-shed.

*Covered rides* and *grooming-sheds* are, in our variable climate, necessary adjuncts to an establishment of anything beyond a very moderate extent. Their construction is a matter of plan rather than of cost. The cheapest mode of obtaining them is by such grouping of the stables or other buildings as to make their external walls available to form the sides of the ride with a light roof extended over it.

Where the space at disposal and the level and ground plan will permit, a good arrangement is to erect two long stables back to back, with a space sufficient for a ride between ; then, instead of placing the lofts over or entirely over the stables, to let them be above the ride only, which, being the highest part of the roof extended across the whole, would produce a good and economical shelter. The front walls of the stables would thus not be higher



No. 33.—Block Plan of Stables and Coach-houses, enclosing a Covered Ride.

A. Stables, each for six horses.  
Loose Boxes.  
E. Four-stall.

D. Two Stalls.  
F F. Coach-houses.  
G. Cleaning, Saddle, and Harness Rooms.

T

than the requisite height of the storey and the 1 be well supported and of simple form, very co disposed for the supply of feed to the stalls.

A plan of such a grouping of the stables and houses, harness-rooms, and the like, as to enclose ride, is here given, which is sufficiently suggestiv for enlargement or reduction, as may be wisl length of the ride is 100 feet by 16 feet in width accommodation is for twelve stalls and four lo on one side, and for two four-stall stables and stall upon the other, with standing for eight harness and cleaning-rooms.

#### § 567. A Dog's Kennel.

The space allowed for a yard dog is invariably contracted, and his house is often damp, cold, and uncomfortable. A dog requires warmth and c retain his health and good temper, for many of the of the poor animals chained to a cramped and dark are due to the tortures they undergo, which produce proformity, rheumatism with its accompaniments of temperament, that make the creature alike dangerous friend and foe; even rabies itself is the result of an unnatural restraint to which he is subjected.

It always seems a cruelty to chain a yard dog; his voice is a sufficient warning of unwelcome intrusion as it would not always be prudent to permit a large



underneath. The ground beneath the whole kennel should be paved or laid with cement or asphalt, sloping to a drain, so that all wet may rapidly run off.

The inside should be wide and lofty, and if high enough for a shelf a foot from the floor at the farther end, for the dog to sleep on, his comfort will be still further secured. A trough placed in the shade, and kept constantly filled with clean and fresh water, is, of course, an absolute necessity. For his bed, clean straw is generally most handy, but, where procurable, the dried seaweed used by upholsterers, especially that which comes from America, is a capital layer, as it is obnoxious to vermin.

The kennel should be a complete structure in itself, rather than a lean-to against a wall, and if sufficiently movable to allow cleaning at times on all sides, the dryness that is so desirable can be better attained. The dimensions of 3 feet 6 inches wide, by 6 feet long, and 4 feet 6 high to the ridge, will be found suitable for the interior of a house for a yard dog of a size not excessively large. The inside should be well lime-washed at least twice a year.

#### § 570. **A Pig Sty.**

The shed forming the pig's dwelling should be so high as to allow a passage at the back for a man to walk along and administer the food over a dwarf wall; the front should open into an enclosed yard. This will ensure proper shelter, good ventilation, and access to the pig's bed to cleanse it. The floor of the sty should be treated in the same manner as that of the stable, with good drainage and sufficient slope towards the drain to ensure dryness and to permit the frequent use of water for washing. In such a house the pig will thrive, for he is naturally a cleanly animal and likes to be washed.

## CHAPTER XIV.

### GATES AND GATE LODGES—CONSERVATORIES AND GARDEN OUT-BUILDINGS.

#### § 575. Accommodation for Gate-keeper.

WHEN the house is so far removed from the high road or other public thoroughfare as to require an attendant at the gate, a place for shelter is necessary. This may either be a small pavilion, large enough for comfort, or a cottage residence. The latter is the more usual provision; but there are many reasons to recommend the selection of a temporary place for the reception of a gate-keeper during his hours of usual duty, in preference to making the lodge the habitation of a family.

A cottage, large enough for comfort, and with the requisite provisions for health and domestic use, is apt to assume dimensions that make it out of scale, excepting at the entrance of an extensive place. On the other hand, the little boxes, built by the side of a gateway, to stow away a man and his wife, and perhaps children, are painfully suggestive of internal discomfort. Better by far, to house the family comfortably elsewhere, and to have a well built little room, with a fire-place and windows, furnished for the use of but one person, whose hours of duty, especially when his services were expected to be required at night, could be interchanged by some good arrangements with his family or fellow-servants.

Such an appendage to a gate could be made always picturesque, and in keeping with the importance of the

gateway, and being only used as a place of waiting, could be finished as required.

If not at too great a distance from the house, a speaking-tube could be carried underground from the gateway to the entrance hall, and the names of visitors or arrivals pre-announced by the servant in charge.

**§ 576. Let Outer Approach be Roomy.**

The external approach to a gateway, however modest its character, should always be arranged on a liberal scale, so as to permit an easy turn from the outer road to the inner drive. If the latter has to run in a direction parallel for a time to the outer road, the turn around the gate should not be abrupt; the curve should at first open as nearly as possible at right angles to the gateway, and then bend with an easy sweep towards the line it has to take. An abrupt bend on either side after entering, is dangerous and unsightly.

**§ 577. Road from Gate to House.**

The line that an entrance road or path should take, from the gate to the hall door, is difficult to decide upon general principles. In many cases, the one is placed so as to be exactly opposite the other, and the space between is comparatively flat; matter of fact would say, then, "make the line as straight as possible, so as to reach the house as quickly as may be;" but there are few situations in which such an approach could be pleasing or convenient. In the first place, without some object intervening, the hall door would be too much exposed to outside gaze when the gate was opened, and, as a matter of appearance, the space would seem less than if the line of approach was devious.

A canon of taste says, "no curve should be made on plan without undulation of surface," which is, undoubtedly,

correct; hence, in practice, the slight inequalities of level that exist, or may be expected to exist, are skilfully taken advantage of by landscape gardeners to justify a curve, or form an excuse for a mound or shrubbery.

In small places, when the house is so near to the public road, that it would be an affectation to provide a carriage drive, or to prolong the approach by a curving line, the straight line is best, and if the distance is so short that an extension of the porch in the shape of a glazed arcade is possible, no arrangement can be better.

#### § 578. Paths and Carriage Drives.

To form good paths or carriage drives, hard surfaces and good drainage are essential. The skill with which the curves have been set out will greatly assist these, for nothing is more destructive of materials than the wash of a heavy rain-storm shot across the road from an upper to a lower curve, or from one side of the road to the other. Such streams quickly cut unsightly channels and wear away the surface and bed of the road, however well made in other respects. The alternate rise and depression of the upper and inner edges of recurring curves compel attention to the certain effects of rain collecting on the surface; the drain pipes and communicating catchpits must therefore be laid with considerable skill and care to receive the flow at the lowest point, and to judiciously carry it from opposite points when the change in the curve converts what was the upper to the lower side. To do this well, the drain laid below the road should cross it at an angle as short as can be safely made, and with good large curves in the elbows; for greater precaution a catchpit for overflow should be made at the point where the direction changes so that any excessive rain-wash may be safely intercepted without damage to the road. The gratings of drains should not be too narrow between the bars.

**§ 579. Gratings never on Surface of Road.**

Gratings communicating with the drains should never be in any other position than the outer edges of the road, not even when the course of the pipes has to cross them underneath; sometimes they are wrongly placed in the middle, to get over some such difficulty as described above, but are unsightly and dangerous, and with good planning this should never be necessary.

**§ 580. Construction of Roads.**

The road should be made of good materials upon a deep, dry, sound foundation, for which building rubbish or the refuse of kilns and potteries is very suitable. The waste from a gas-house spread beneath the upper surface of the top gravel is good as a preventive to growth of weeds; but it must not be carried too near to the edges, or the grass and other vegetation will suffer. However well made the road, or good the materials, the latter will not bind and remain in order without perfect working of the system of drainage; so that must be the first matter to receive attention. Drain pipes leading to an outlet will be found more lasting and serviceable than a stone drain or trench.

When the road is beginning to show wear, the loose metal at the sides must from time to time be taken up and spread upon the centre, so as to preserve a regular curve, and prevent depressions in the middle. When gravel is used, a small quantity of chalk thrown over it is a good binding material.

**§ 581. Gates: Lightness and Durability.**

The construction and form of a gate is of considerable importance. For lightness and durability iron is the best, whether of open framing or filled in with metal plates. A wooden gate should be light, and so framed as to resist the

shock of falling-to, or it will quickly shake itself to pieces. It should be entirely clear of the ground, or the damp will rot it at the bottom and destroy the whole.

#### § 582. Opening of Gates.

The proper opening of a wide gate is a matter requiring nicety. When in one length, it can be more conveniently attended to; but it will require strong posts with good abutments, well-made hinges, and a level flat of some yards at the entrance. If the level of the road requires the gate to rise considerably, lifting hinges, however well made, are hard to work, and cause a great strain upon the posts and framework; hence the usual division of a gate into two parts. To open these it is necessary that the half at first thrown back shall readily fall into a receiving fastener, that can be relied on to keep it in place until released, whilst the other half, kept in hand, is swung back. Accidents have happened from the failure of the clip depended on to catch and retain the loose half of the gate, and a mechanical appliance is manufactured which, by means of a chain and pulleys laid beneath the gate, opens one half whilst the other is being swung back by the attendant, closing by the same process when the same is brought back to the centre.

This and all other such contrivances require, however, excellent workmanship and intelligent usage to remain in workable order.

#### § 583. Width of Roads.

The width of a road must partly depend upon the extent and pretension of the place: there is no advantage in having it greater than practical use requires, as the expense of weeding and keeping in order are considerable. Mr. Hughes sensibly says, in his thoughtful and practical treatise ("*Garden Architecture and Landscape Gardening*"), "As no

entrance road need be wider than enough to let two carriages pass, fourteen feet is sufficient for the largest place; and as the width of the road preeminently gives scale, it should never be made, in a small place, more than nine or at most ten feet—enough for one carriage to drive handsomely. It is thus kept in order by the traffic, and the weeds kept down, which will not be the case where the road is double the width of the travel."

#### § 586. *Conservatory and Greenhouses.*

The cheapness of glass has introduced an almost novel principle of construction, and since the days of the Great Exhibition first showed its intelligent use, scarcely a place however small but has its glass house in wood or metal frame, if only for a small fernery or plant cabinet.

The conservatory may now be considered an usual adjunct to the house, and is no longer a plant-manufactory for the professional gardener; it should therefore be so built and arranged as to be capable of general and comfortable use. Its defects often consist in too much glare and heat, from the large surface of glass and the absence of proper screens to temper the rays of the sun. Canvas screens or wood mats permanently placed and easily rolled are indispensable, but, with these fully supplied, the conservatory, as usually designed, still has too much glass overhead for pleasant enjoyment of the interior.

As an external cover, glass is so cheap and easily adapted that the fault is natural; but there is no reason why inner surfaces of other material should not be extended at intervals below the roof to soften and cool the light. For these, canvas screens, painted white (or light colours) externally, and cooler grey or green tints on the lower side, are useful; and when trailing creepers are trained against them, the internal effect is pleasant.

To soften the light further, painted linen blinds on rollers

are useful ; the glass, however, ought to be clear and transparent : if opaque, the outer view is lost, and the interior becomes cold and isolated. Stained glass always seems out of place ; its brilliancy destroys the soft brightness of the flowers, and the coloured reflections are antagonistic and often injurious. Within, all may be as bright and gay as the brilliant hues of the flowers and lovely vases, stands, floor and wall tiles can make the picture ; but the glass of walls and roof should certainly be colourless.

**§ 587. Warming: moist Heat required.**

For warming, a moist heat is preferable, and nothing can be better than most of the low-pressure hot-water appliances in vogue. For occasional use, and on a small scale, a gas-stove, supplied with a large water-pan for evaporation, self-filling by means of a ball cock, is convenient and inexpensive ; it is, moreover, easily managed, and therefore well adapted to the requirements of an amateur, but without caution gas is destructive to vegetation.

**§ 590. Winter Garden.**

The large enclosures of glass roof and sides, that are now so easily made available for formation of *Winter gardens*, are a most welcome addition to our enjoyment of shrub and flower during the cold and gloomy months. These would probably be in still more general use were they shown to be as inexpensive in construction and maintenance as they really could be made to be.

**§ 591. How to manage the Winter Garden.**

The first essentials are good, thick external walls of brick or stone, thoroughly impervious to cold, and almost without openings. These should be covered with ivy, or so planted



against as not to permit their surfaces to be seen. The warmth of these walls may be increased by building them double, with a flue from the heating apparatus carried between.

Height is an advantage in the glass roof over a winter garden; and the construction of the roof cannot possibly be upon a better model than that of the Palace at Sydenham and its annexes, namely, a number of small ridges and valleys, requiring but light framework for each, with rolled girders and iron pillars supporting the whole.

The interior should be laid out entirely with reference to its wintry use; camelias and dwarf evergreens, with choice foreign blooming shrubs, as permanent fixtures, the flowers being removable as the greenhouses afford a fresh succession. Walks and beds should be disposed in the interior as if out of doors, the treatment being more agreeable if natural than when such a garden is laid out as a conservatory, with tile for walks, and the like.

Fountains, rockeries, marble statuary, and all sorts of gaily coloured embellishments are suitable, the columns and constructive portions of the roof being coloured and decorated just sufficiently to prevent bareness when not covered with creepers and twining plants.\*

The seats within the winter garden should be of wood for healthful use, and should rest upon platforms of sufficient extent to ensure dryness to the feet. Many an invalid suffers from stone seats and cold paving.

#### § 594. *Our Gardens too Artificial.*

The artificial works about the grounds of a house require a separate volume to themselves. As a rule, there is apt to be too much of the architectural about our gardens, as evi-

\* See Robinson's "*Hardy Flowers and Alpine Plants.*" London, 1870-71.

denced by the multiplicity of balustrades and steps, pedestals and vases, formal rock-work, and all the cheap rubbish of the New Road. Much of the vicious taste lately prevalent in this respect is certainly due to the enormous mass of such work in the otherwise charming grounds of the Palace at Sydenham; but the evil will work its own cure by the lessons that the shabby appearance of decaying stucco and tumble-down arcades present. No doubt the directors will gladly reduce much of this to the green slopes and turf-covered banks and shrubberies of what is called our English garden style, as opportunity occurs.

#### § 595. Union of House with Grounds.

The house itself, when of any size, has in its immediate adjuncts sufficient to unite the building with the grounds, without carrying masonry into the garden. Even in the smallest villa, the porch, veranda, balcony, conservatory, each or all, serve sufficiently to break the abrupt rising of the building from the surface of the ground, and to lead its outlines to the undulations of the shrubberies and plantations.

#### § 596. Treatment of Breaks in Level.

For changes in level, terraces and slopes, when necessary should be treated as natural features rather than as engineering works, having only so much of the latter character as recognizes thorough stability and good construction. But inasmuch as Nature herself delights in variety, it must not be understood that the introduction of objects of constructive art, in the shape of pedestals, vases, balustrading, and the like, is condemned,—far from it; a beautiful object, well placed, is always enjoyable. It is only insisted upon that the natural treatment, as it is called, is best suited to our English gardens, and that such features as have been alluded to, and

which are elements of the Italian style of laying out grounds, should be considered in the light of accessories to be employed only in suitable situations.

The taste of a cultivated English family in the country may very safely be left to itself in all such matters as relate to the garden; it is only in the suburbs of towns, or amongst the newly settling townspeople in country places, that questionable practices commonly arise.

### § 602. *The Dairy.*

Amongst the useful outbuildings necessary to an establishment in the country, the dairy and the ice-house deserve mention.

As a matter of course, the dairy should be cool and well ventilated; but it is not every builder that really knows how to make it so.

In the first place, the walls should be thick, and there should be no glass whatever in any of its apertures for light, excepting for winter use. The window-openings should be narrow, but high, and should be filled with wire gauze internally to exclude insects, and with thin canvas blinds outside, which in very hot weather may be kept saturated with water. The shade of an elder tree outside will impart an agreeable coolness, and will also assist to keep out dust. These openings should be screened from the sun; but experience has shown that an entirely northern aspect is undesirable, for the rays of the sun purify the air and assist evaporation. Each opening should have an internal shutter, to exclude or temper the light of very bright days; for a subdued light within a dairy is desirable; then a swing sash, glazed with thick, rough glass, for winter use.

If a one-storey building, the roof must be a non-conductor, so as to impart no internal heat. This can be done best by enclosing a space for confined air between

the outer boarding and the ceiling. For the ceiling, tiles laid in cement form the best possible material ; the same also of the walls. The floor should be laid so as to incline each way towards a central channel, with a trapped grating at the lowest point, communicating with a drain. A small scullery, with sink, drain, and supply of soft or filtered water, should always be attached to a dairy, but so as not to open into it.

**§ 603. Ice should never be Employed.**

For the shelves, marble, slate, thick rough glass, and earthenware slabs are variously employed ; in a large establishment under peculiarly intelligent management, white wood boards, made so as to rest on bearers, and taken out and washed daily, were recommended to the author as more cleanly and satisfactory than any of the above. Ice in a dairy should never be necessary : there is always a reaction, and consequently a danger of fermentation, if the air within a dairy is brought artificially much below the natural temperature of pure air in the shade. The best *temperature* for a dairy to obtain the largest amount of cream is  $60^{\circ}$  to  $62^{\circ}$ , on no account to exceed  $65^{\circ}$ . This is of great importance to observe ; a thermometer, therefore, is an indispensable requisite for a dairy. Coolness and cleanliness being essential in a dairy, it ought to be cut off if possible from kitchen and scullery. All washing and cleansing of vessels should be done on the outside, for fear of contaminating the air. For the same reason receptacles for apples or vegetables, sinks or sewers, should not be permitted near the dairy.

**§ 604. Dairy Utensils.**

The utensils of a dairy should be of earthenware or glass, as easily cleaned. Attention may be called to the

wonderfully rapid atmospheric churn—a patent American invention, of great utility and ingenuity. Cheap covers are made of thin muslin, which, while they admit air, keep out dust and flies from the glazed dishes into which the milk is poured.

The above few and simple rules as to the construction of a dairy will be found equally to apply to outside larders or game-rooms.

#### § 607. Fruit Room.

A *Fruit Room* is often necessary, and is better if in a building set apart for the purpose, the aroma of stale apples being of all things the most disagreeable inside a house. Its requisites are perfect dryness, semi-darkness, and even temperature. Security from moisture is the first essential condition, and, this obtained, it does not matter of what material it may be constructed, so long as great heat is excluded, and an uniform temperature is maintained. The plan of ranging shelves against a wall is not so good as that of placing stages a sufficient distance from it to permit circulation of air, leaving a passage round to remove defective or decaying fruit. The best material for shelves is broad, thin laths, with short intervals between each, and plenty of space from one shelf to the next. The floor of the room should be covered with dry sand, frequently swept out and renewed.

#### § 608. Ice House: above or below Ground.

The *Ice-house* may be sunk entirely below ground, placed in the slope of a hill, or built above the surface. The latter is the mode most in favour in America, Norway, and Sweden, and probably would be preferred here had not habit led us to follow the old mode of sinking it in a hill.

### § 609. Its Construction.

Wherever placed, its construction must be contrived to secure absolute separation of the interior from external atmospheric influences. It must be of such thickness as to walls and roof that no external heat can penetrate, and its door must be so hung and fitted that air cannot enter. As the size of the building is inconsiderable, durable materials and good workmanship will be found the cheapest in the end; therefore hard bricks for the internal wall, then a space of not less than three inches, and an inner wall laid and faced in cement, the plate of the roof resting on the outer wall, and the rafters of the ceiling on the inner, with nothing between to serve as a medium of conduction, slates on boards with a layer of felt between, and a coat of lime-white over all to prevent attraction of the heat of the sun, will be found the best roof-covering.

### § 610. Danger of admitting external Air.

Ventilation is sometimes spoken of, and a communication recommended to be made through the roof; but the interior can be better *made* and *kept cool* by preventing any external openings whatever, near to the top. Drainage is essential, but it must not be obtained by connecting with any general drain, or heated air will be sure to ascend and find a passage to the interior.

### § 611. Serviceable light Wooden Ice-houses.

Experience in this special matter enables the author to recommend the following as a safe and economical mode of constructing an ice-house either above or below ground. It should be stated, however, that light wooden structures can be made equally serviceable for the storing of ice, if the conditions insisted upon, viz., insulation and shelter

from external atmospheric heat, have been obtained. The spot chosen should have a dry soil, sand or gravel, for preference, for the foundations. The floor may be sunk three or four feet below the surface, but not to a deeper level than can be drained by an external drain-pipe carried around the building.

The bottom of the house should be constructed of dry, closely packed gravel, with a layer of concrete, on which the floor should be formed of smoothly finished cement laid with a slope to the centre, in which should be a circular cesspit, two feet in diameter, and of a sufficient depth beyond four feet as will serve to reach a dry porous stratum of earth that will absorb the water quickly. The external drain previously spoken of should be of sufficient depth to draw off all moisture from the earth within ; but *there must be no connection* with the cesspit and drain, other than that afforded by *filtration*.

Upon the cement floor should be fitted  $1\frac{1}{2}$  inch boards covered with sawdust, to receive the ice when packed in. This is recommended rather than to let the ice rest upon the cement.

#### § 612. Double Doors and Wooden Steps.

The doors should be made about four inches thick, framed in two thicknesses with a space between, and should be double, one opening externally and the other in two halves hung against the inner wall. The steps within should be light, and of wood, as less likely to conduct heat from the exterior than if of stone or brick. The height of the doors should only be just sufficient for ingress, with the usual width.

The walls have been already described, and should be lime-washed.

**§ 613. Ice should be put in Dry.**

The ice, when put in, should be kept as dry as possible. Some writers have directed water to be poured on ; but this is a mistake, unless the external temperature is so low that it will at once freeze without wasting the ice : the drier in every way that ice and the walls and floor around it can be kept, the better.

**§ 614. Ice House should be Shaded.**

The situation of the ice-house should be chosen where shade can be obtained, either by trees already existing or where they can be planted with a prospect of rapid growth. The elder is said to yield a peculiarly cool air around its immediate neighbourhood, and has been recommended for such a purpose. A trellis covered with any hardy creeper, or with ivy, is also very useful, and should surround the ice-house at a distance of two feet or thereabouts.



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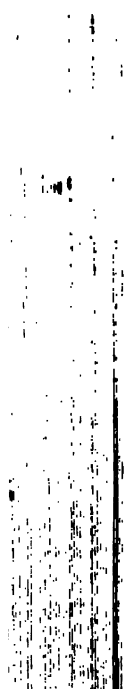
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